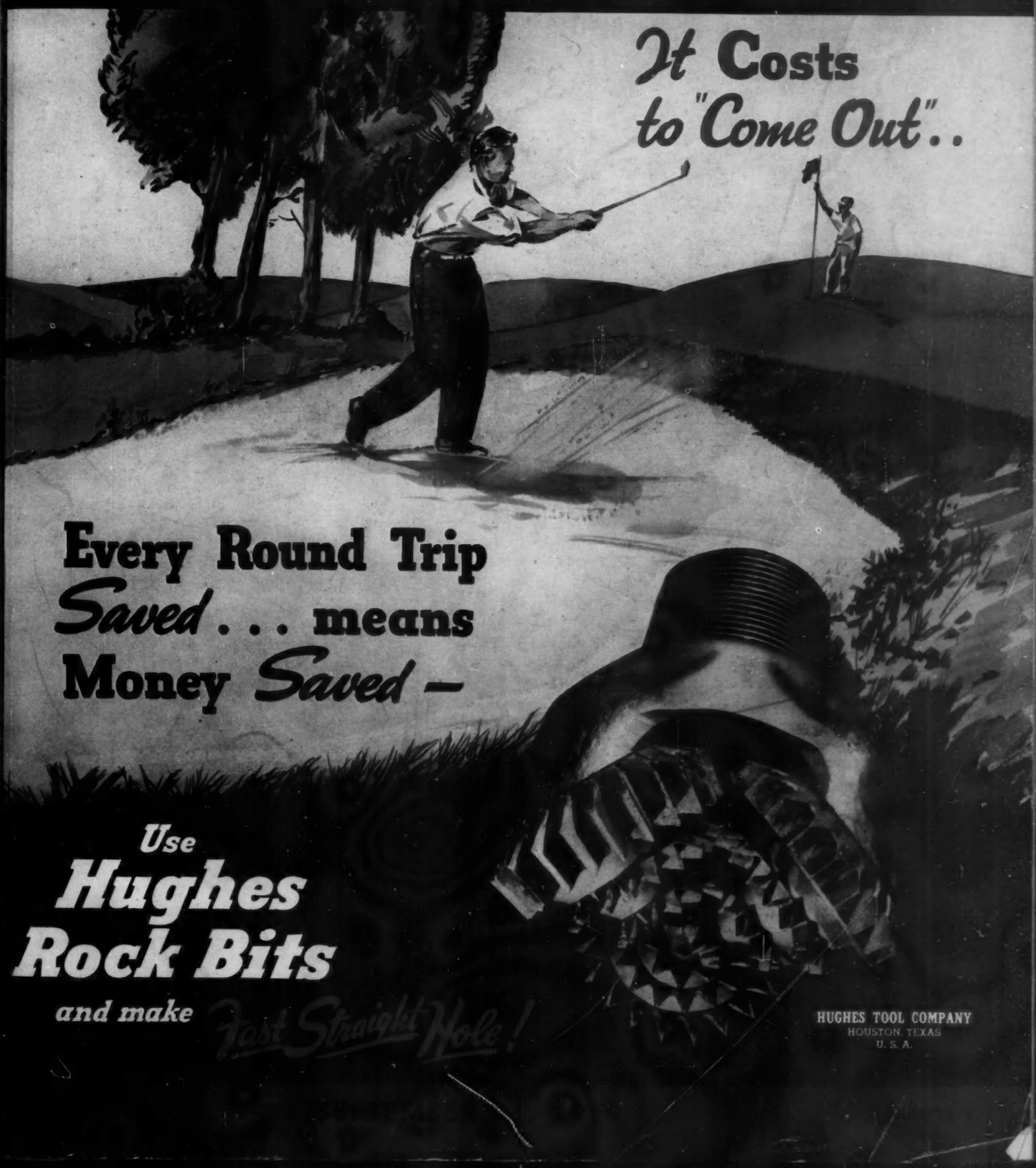
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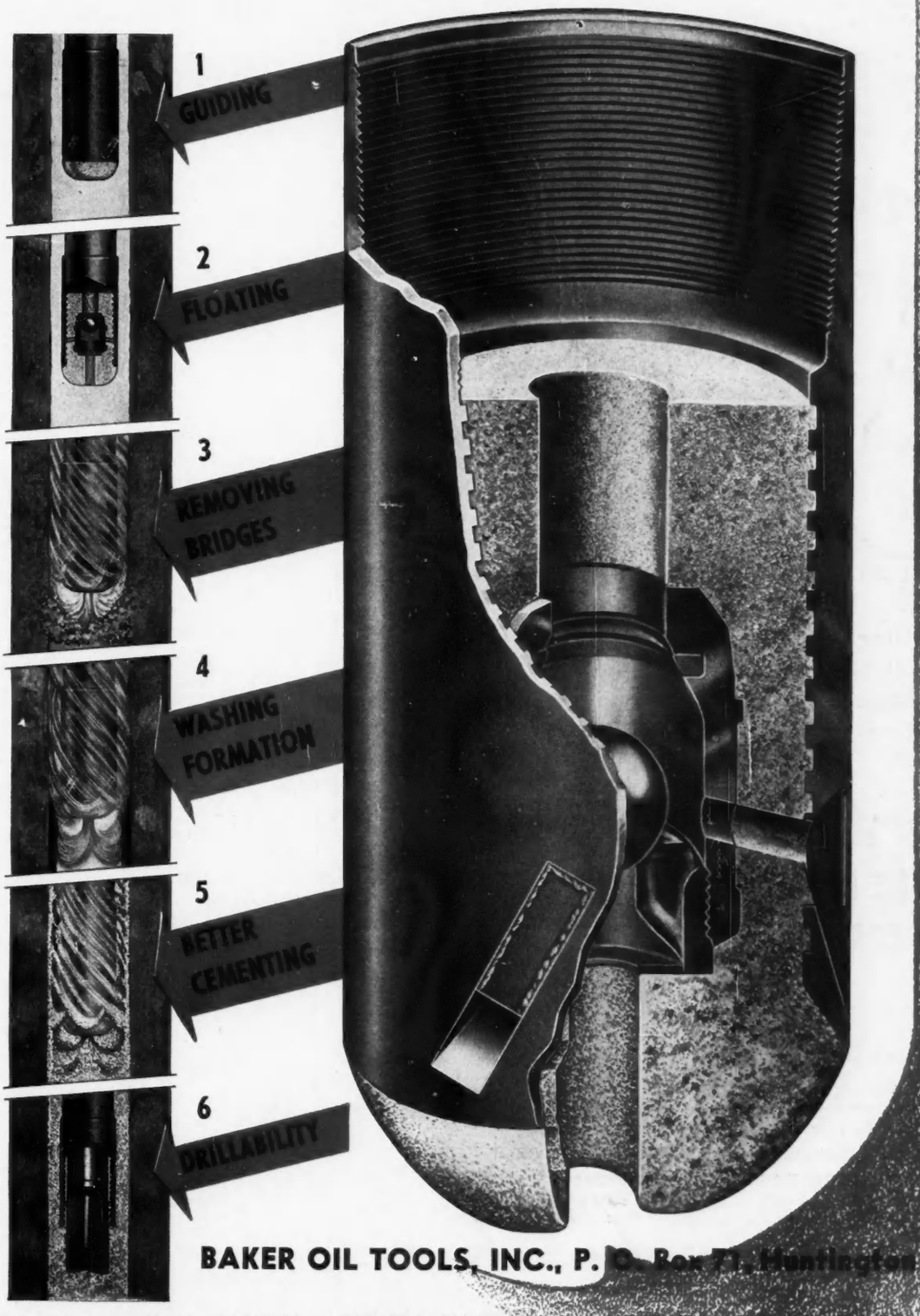

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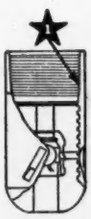

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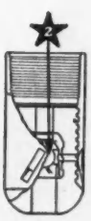

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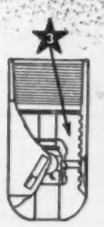

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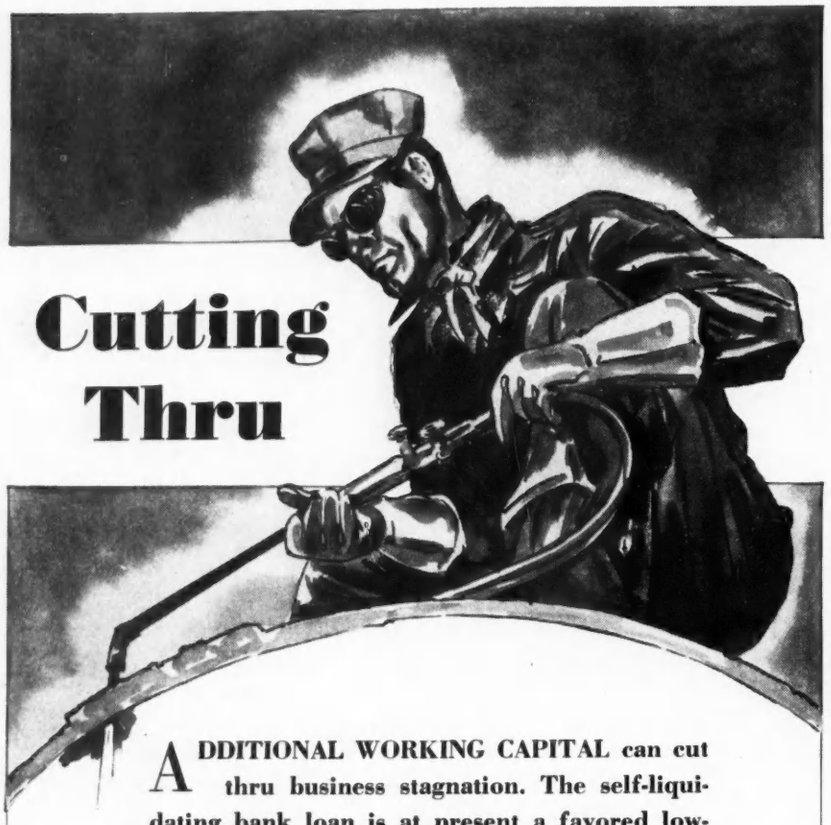

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LOOKING AHEAD

WITH THE EDITOR

Branch Water May Not Do for Flooding Oil Sands

OPERATORS who commence water flooding projects with the idea of merely displacing oil with water injected into the producing horizon will be sadly disappointed in the results obtained. It is generally realized that to successfully flood a property that recoverable oil must be present and that sufficient power is required to conduct the various phases of the operation, but too often the necessity of having both a suitable quantity and properly conditioned water supply is overlooked.

It is seldom that water sources free from foreign material can be located. Water to be used for repressuring the oil-bearing sand should be absolutely clear and stable; free of suspended and organic matter. If the water is not treated properly to attain these qualities, it is apt to plug or seal the pores or void spaces in the sand. In which cases, instead of recovering additional oil, it will trap much of the quantity that exists in the reservoir.

An early article that THE OIL WEEKLY will publish is to deal with water requirements for flooding operations. Written by a chemist with many years of experience along this line, it points out the dangers of neglecting the water phase, and suggests practical steps for curing many difficulties.

If the various water factors stressed in this article are given full consideration, little if any difficulty will be experienced from this phase of flooding operations. But, if any part of them are neglected it is likely the flood will prove unsatisfactory.

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E. Eng. Lib.

THE OIL WEEKLY

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The Oil Man's Calendar

SEPT.	
11-15	American Chemical Society, Boston, Mass.
13-15	National Petroleum Association, Atlantic City, N. J.
27-28	West Virginia Oil & Natural Gas Association, Charleston, W. Va.
OCT.	
5- 7	American Institute of Mining & Metallurgical Engineers, Petroleum Division, Galveston, Texas.
5- 7	Texas Mid-Continent Oil & Gas Association, Houston, Texas.
9-10	American Gas Association Annual Convention, New York.
16-20	National Safety Congress, Atlantic City, N. J.
17	National Stripper Well Association, Fort Worth, Texas.
18-20	Independent Petroleum Association of America, Fort Worth, Texas.
19-20	A. I. M. E. Petroleum Division, Los Angeles.
NOV.	
13-17	American Petroleum Institute, Stevens Hotel, Chicago.
15-17	American Institute of Chemical Engineers, Providence, R. I.
DEC.	
4- 7	American Society of Mechanical Engineers, Philadelphia.
APR.	
10-12	American Association of Petroleum Geologists, Chicago.
11-12	American Petroleum Institute, Eastern District, Division of Production, Columbus, Ohio.

Contents « September 11, 1939

Volume 95, Number 1

This Week's Panorama.....11-12

Feature Section.....13-63

Extended European War Would Consume Much Petroleum..... 13
BY L. J. LOGAN

Where Will Warring Nations Obtain Their Oil?..... 16
BY W. V. GROSS

As We See It . . . Bugaboos Are Fading..... 18

High Rod Stress in Deep Pumping Costly..... 19
BY RICHARD V. JAMES

Importance of Gas in Petroleum Production..... 27
BY CLIFFORD R. HORN

Probable Gulf Coast Discovery Rates..... 47
BY V. G. GABRIEL

News Section and News Index..... 69

Men in the Industry's News..... 66

World Developments..... 65

Notes from the Equipment Buyer and User.....108

Squeaks from the Bull Wheel.....113

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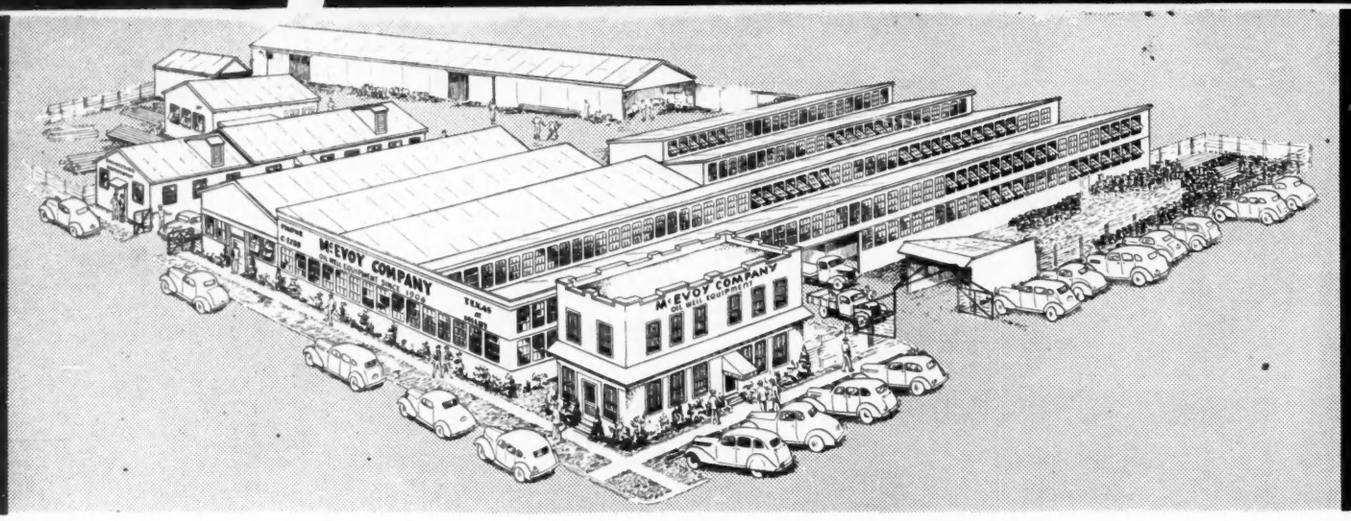

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THE OIL WEEKLY

SEPTEMBER 11, 1939

VOLUME 95 NUMBER 1

The Week's Panorama

USE of petroleum products continues to expand on every hand, but the most significant advancement is in the consumption of petroleum fuels. Today, total consumption of petroleum fuels of all classifications except gasoline is about 500,000,000 barrels annually; very nearly 50 percent of total demand. And, at the rate of increase being shown, petroleum fuels (collectively) will soon eclipse gasoline as the most important product of the industry.

Petroleum fuel finds its greatest utilization in domestic oil burners and in kitchen ranges, the two combined accounting for 30 percent of the annual consumption, according to the United States Bureau of Mines. Next in order of utilization are oil-burning vessels of the merchant marine, which account for 17 percent of the total; railroads, 14 percent; the army, navy and coast guard about 2 percent; and farmers' tractors about 1 percent.

Oil Heats Many Homes . .

Mr. and Mrs. Homeowner and Renter have gone in for oil heating in a big way in the last dozen years according to reports of the United States Census of Manufacturers. The increase in use of petroleum fuel for house heating has been at the rate of 400 percent since 1926.

The increase in the number of oil burners in operation has been at an even greater pace—from 177,400 burners in 1926 to 1,657,942 burners in 1939, an increase of about 930 percent.

Oil consumption rose less than half as fast as the number of burners in operation, indicating a marked improvement in burner efficiency and economy. The consumption of fuel oil for domestic heating in 1938 was approximately 120,000,000 barrels compared with 22,780,000 barrels in 1926.

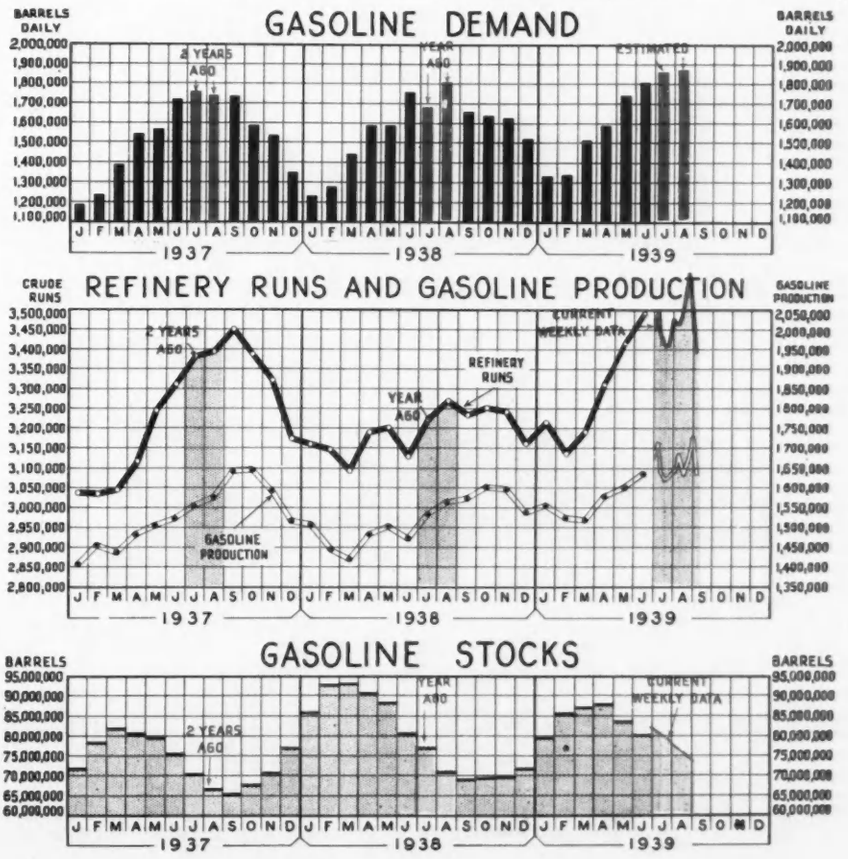
More Farmers Use Oil . . .

The American farm has become a mechanical institution, depending more and more upon power from fuel oil and gasoline, almost to the extinction of the horse and mule.

According to agricultural economists at the University of Illinois there was a 60 percent reduction in the percentage of farms depending upon horses and mules for power in that state between 1931 and 1937. Simultaneously, there was an increase of 330 percent in the percentage of Illinois farms depend-

Lower Refinery Runs Fail to Show in Stocks

Although activity of refining plants was 100,000 barrels lower than in the preceding week, rate of gasoline stock withdrawals also drops.



ing upon general-purpose tractors. The use of complicated machinery, such as the combine, corn-pickers and balers, has increased rapidly among the farms surveyed and the use of motor cultivation for row crops has become important.

The farmer, apparently, has become more efficient in the use of his tractor and depends upon it almost exclusively. The number of hours of use per tractor has almost doubled from 340 annually to 600 hours per year. Cost of tractor operation has been cut in half, dropping from 87 cents an hour to 46 cents an hour, the report discloses.

Farmer Works Fewer Hours . . . . .

The farmer has found that less work per farm and per year are required with increased mechanization. The average number of hours labor required per farm declined 35 percent, 6678 hours yearly to 4317 yearly.

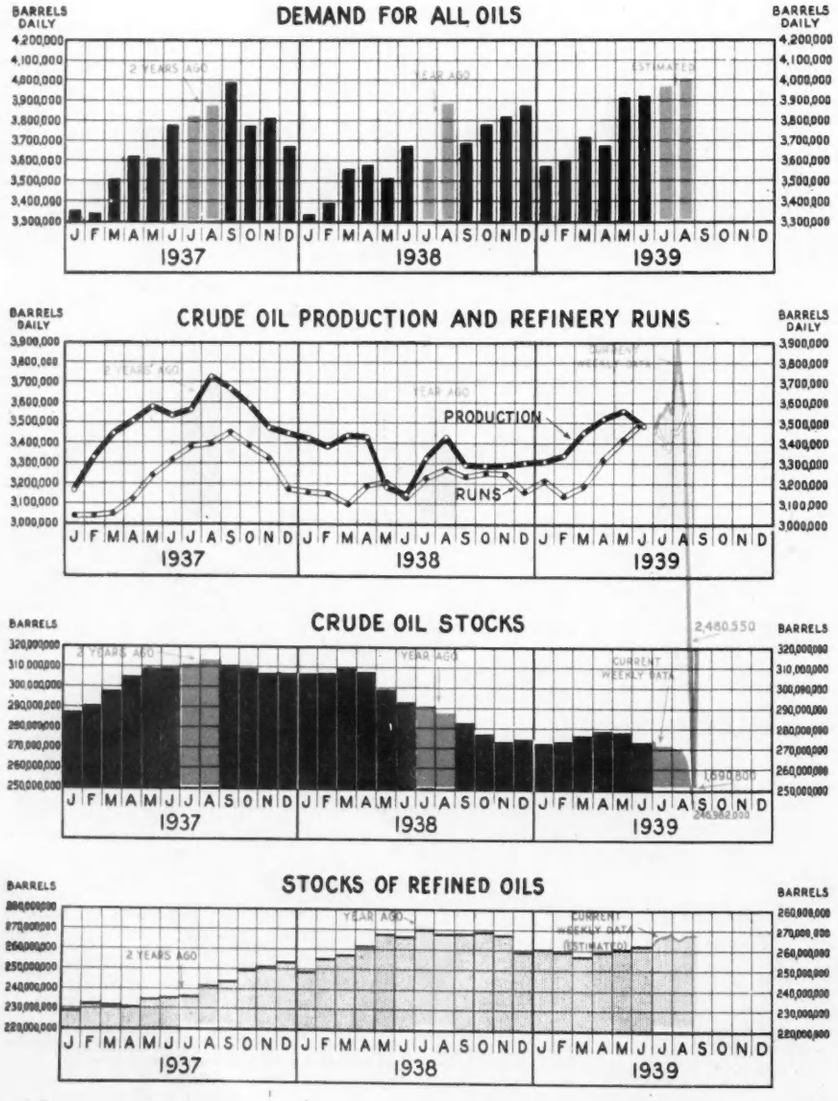
Shutdowns Reduced Stocks

Now that sufficient time has passed to make available statistics on the trend of the industry's storage inventories during the recent 15-day production shutdown in six major states, the full import of this unusual action may be measured with greater clarity. Approximately 20,000,000 barrels of crude oil and 2,500,000 barrels of gasoline were drawn from storage. This very sizeable reduction in stocks is certain to have a beneficial influence for some time to come.

It is somewhat disappointing that gasoline stocks were not reduced to a greater degree. This is particularly true in view of the passing of the heaviest motor-fuel-consuming season and the approach of that period of the year when the refining of sufficient heating fuels to meet winter demand causes excessive quantities of gasoline to come from refinery stills. It appears, with furnace oil consumption running about 20 percent greater than a year ago, that gasoline stocks will be increased to a greater degree than a year ago. Since the present quantity of refined motor fuel in storage, even after the shutdowns, is larger than a year ago, this indicates these stocks will rise to levels exceeding last winter.

Crude Stocks Experience Record Withdrawals

More than 15½ million barrels of crude taken from storage during the week ended August 26 because of production shutdowns.


DEMAND FOR ALL OILS
BARRELS DAILY
2 YEARS AGO
YEAR AGO
ESTIMATED
CRUDE OIL PRODUCTION AND REFINERY RUNS
PRODUCTION
RUNS
CRUDE OIL STOCKS
CURRENT WEEKLY DATA
STOCKS OF REFINED OILS
CURRENT WEEKLY DATA (ESTIMATED)
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1937
1938
1939

War Enters Picture . .

However, the industry cannot expect this to be a normal year. The war in Europe will consume huge volumes of petroleum products. With such mechanized forces as airplanes, tanks and trucks playing a tremendously larger part in war operations, gasoline is to be much in demand. What portion of petroleum products used in the war will come from the United States is still too early to determine, but it is expected that a very large part will originate here.

Record Crude Stock Drop

Withdrawals from crude oil stocks were at a record weekly level during the period ended August 26, as 15,504,000 barrels were drawn from tanks. This brought stocks of this crude down to 246,982,000 barrels.

On the other hand gasoline stocks during the week ended September 2 dropped but 281,000 barrels as they reflected the resumption of crude oil production in Texas, Oklahoma, Kansas, New Mexico, Arkansas and Louisiana.

Meanwhile, stocks of refined oil failed to continue their upward trend of recent weeks, standing at their 265,000,000-barrel level of the previous week.

Extended European War Would Consume Much Petroleum

By L. J. LOGAN, Associate Editor

IN London it has been commented that America is likely to make a great deal of profit out of the new European war.

Those comments echoed in Wall Street when the first trading in American securities commenced after declaration of war. And in the vanguard of the sharp advance of stocks were oil company securities, which rose 18 percent over night, while industrial securities in general moved up less than 4 percent. It was figured in Wall Street that the oil industry would rank along with steel and copper as one of the lines which would do materially greater business because of war.

Within the industry, too, this view has been taken. And in this day of highly motorized armies it must be conceded that the war does seem to hold possibilities of substantially increasing the consumption of petroleum.

Since all the nations now engaged in the European war lack adequate domestic petroleum supplies for their peace-time consumption, they must depend upon imports to meet the considerably greater demand created by war. The acquisition and transportation of adequate supplies of oil and oil products, therefore, is one of the most critical problems faced by belligerents.

Aviation Gasoline Needed

A petroleum product that undoubtedly will be in great demand for export to the fighting countries is aviation gasoline. The world's refining facilities for making the exceptionally high octane gasoline required by airplanes have been limited even under peace-time conditions, and the United States is credited with facilities for making the best aviation gasoline available.

Already the demand for aviation gasoline has increased materially at United States refineries, following the outbreak of the new war. Aviation fuel was reported to have gone up a full cent a gallon in tank car prices within a few days at the outset of the hostilities, and stocks were reported comparatively light.

Regular grades of gasoline also have been in appreciably better demand since the declaration of war, and prices at the refineries have shown some further advance, although the better market may have reflected not only the war but also the recent Mid-Continent oil field shutdowns and the resultant slowing down of refinery operations.

Nevertheless, gasolines of all grades will be needed in large quantities by the warring nations, for use in automobiles, motorcycles, trucks, and tanks.

While gasoline will be the chief requirement of the armies and air forces, fuel oils will be the main product needed by the navies; and in terms of barrels, the navies will

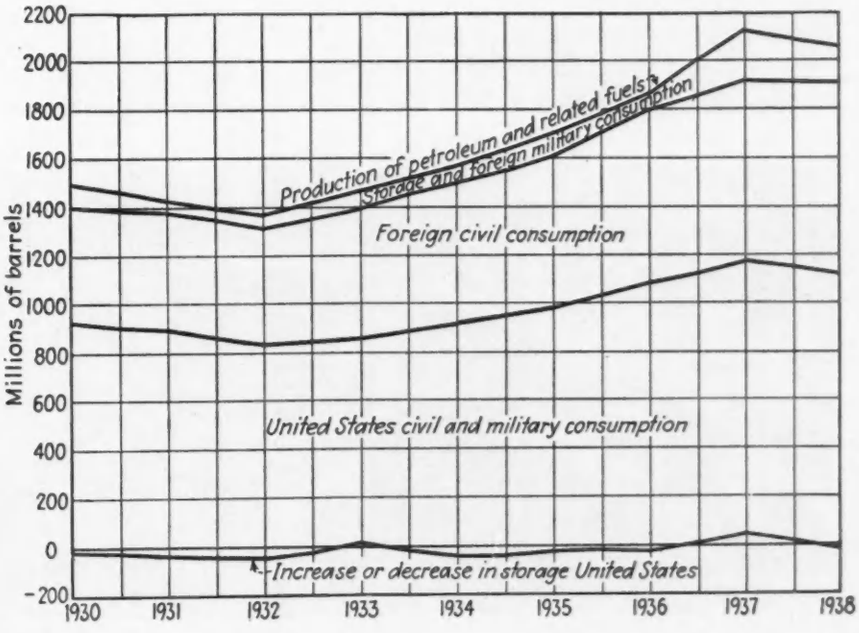
Military Use and Storage of Petroleum Up Greatly in Recent Years

Taken from Petroleum Development and Technology, 1939, compiled by V. R. Garfias, R. V. Whetsel, and J. W. Ristori.

(In Thousands of Barrels)

	Production of Crude Oil and Related Fuels	Consumption of Petroleum and Related Fuels	Excess Production Over Consumption			United States		Military Consumption and Storage Outside U.S.A.
			United States	Outside United States	World Total	Excess Exports Over Imports	To Storage	
1932	1,362,039	1,348,407	*13,011	26,643	13,632	28,781	*41,792	55,424
1933	1,467,128	1,406,923	67,427	*7,222	60,205	60,254	7,173	53,032
1934	1,562,834	1,507,599	26,164	29,071	55,235	64,013	*37,849	93,084
1935	1,702,793	1,614,475	53,027	35,291	88,318	75,474	*22,447	110,765
1936	1,864,997	1,795,560	52,209	17,228	69,437	74,890	*22,685	92,122
1937	2,121,337	1,914,856	161,445	45,036	206,481	115,677	45,768	160,713
1938	2,062,090	1,907,507	130,770	23,813	154,583	139,000	*8,230	162,813

* Reduction



Sharp Increase in Oil Exports to Japan Caused in 1937 and 1938 by Sino-Japanese War

(Compiled from Minerals Yearbook; figures indicate barrels)

YEAR	Crude Oil		Gasoline		Gas Oil & Fuel Oil		Total (Crude, Gasoline, Fuel Oil)
	Exported to Japan	Percent of Total U.S. Exports	Exported to Japan	Percent of Total U.S. Exports	Exported to Japan	Percent of Total U.S. Exports	
1934	7,944,000	15.9	1,079,000	4.7	7,917,000	30.5	16,940,000
1935	10,500,000	20.5	699,000	2.4	9,292,000	35.6	20,491,000
1936	10,381,000	20.6	1,081,000	3.8	9,256,000	26.5	20,718,000
1937	15,995,000	23.7	1,402,000	3.7	10,353,000	22.8	27,750,000
1938	21,290,000	28.6	1,479,000	2.9	8,327,000	17.5	31,096,000

Note: Current Japanese military campaign against China began July 7, 1937, and is a continuation of the Manchurian occupation which began September 18, 1932.

need much more oil than the other divisions.

The other main war-time oil product is lubricating oil, and the market for lubricants in the United States already has felt the war influence. In the Mid-Continent, refiners last week sharply advanced their quotations on bright stocks and neutral oils, used in blending lubricants. One company raised prices for bright stocks 1½ cents a gallon and for neutral oil 1 cent. Supplies were scarce throughout the Mid-Continent and on the Gulf Coast.

The relative importance of the different petroleum products in warfare is indicated by available figures on approximate use for military purposes in 1937. In *Petroleum Development and Technology, 1938*, V. R. Garfias, R. V. Whetsel, and J. W. Ristori estimated world consumption of petroleum and related products for military purposes in 1937 at 57,945,600 barrels, divided as follows:

Product—	Barrels Used in World for Military Purposes
Motor Fuel	12,141,500
Gas and Fuel Oil	45,299,000
Lubricants	505,100
Total	57,945,600

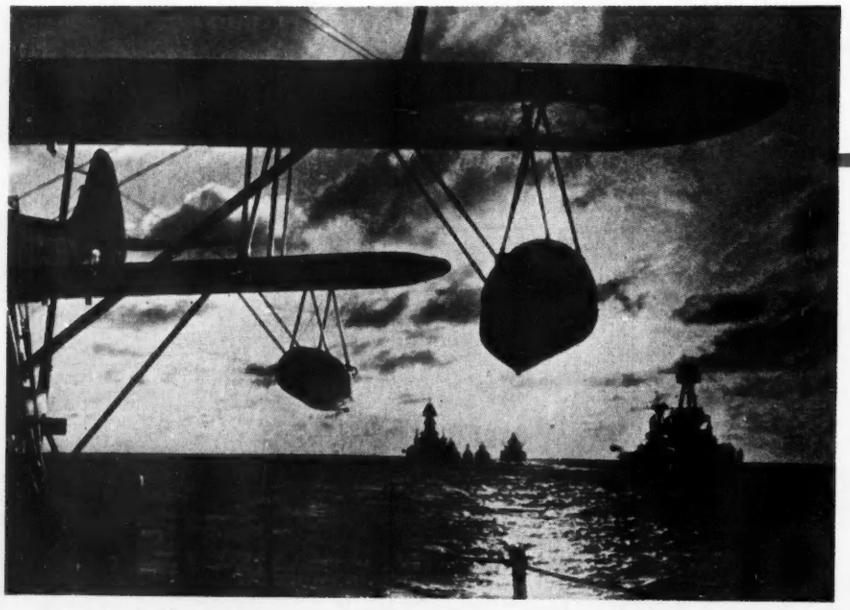
By the several main divisions of the military service, the above total was divided as follows:

Branch of Service—	Barrels Used by All Countries for Military Purposes
Navies	42,217,500
Air Forces	9,744,000
Armies	5,953,200

The latter table shows the comparatively great importance which the air forces have come to occupy, and the large potential demand for aviation gasoline in a major war.

A breakdown of the requirements for military purposes by individual countries in 1937 is given in accompanying tables.

However, the air forces of the



TODAY'S ARMIES ARE HIGHLY MOTORIZED

Present armies are mechanized to a degree heretofore unattained, and consequently will consume important quantities of oil products.

In the new conflict, aviation forces of nations at war are many times the size of those that engaged in the World War.

War ships of Europe's belligerents will require vast quantities of oil in carrying on sea operations.

Tanks will play a significant part in military action, as evidenced by reports of the German advance on Poland.

major powers in Europe have been greatly increased in 1938 and 1939, and the 1937 figures are far out of date now. Germany, particularly, now claims a far greater number of planes than the number indicated for the end of 1937, and is turning out new aircraft in large numbers.

Oil in World War

Europe's armies are much more highly motorized now than during the World War, and thousands of high powered war planes, consuming great quantities of gasoline, contrast with the relatively few and fragile planes of 25 years ago. As indicated above, air forces now consume more fuel than the armies. Obviously, gasoline is now a much more urgent need than in the World War, and lubricants are similarly more indispensable, while fuel oil will be needed as before for the navies.

At the beginning of the World War, exports of oil from the United States to Europe decreased sharply, because of the great shock to the world from the opening of the conflict. Furthermore, exports of crude oil continued to decline through 1917, apparently because Europe had limited refining facilities and was less able than before to turn out finished products after energies were diverted to war activities.

Although gasoline exports to European countries were abnormally low in 1915, they more than doubled and exceeded 1914 proportions in 1916 and rose still higher in 1917 and 1918. Europe finally had begun to draw on the United States for war fuels.

Shipments of fuel oil increased even more sharply after the setback of 1915, and lubricants followed a similar course.

But kerosene, a non-military product, suffered a decline in movement to Europe as the World War progressed. The decrease in foreign demand for kerosene cancelled, in fact, a substantial part of the gain in exports of gasoline, fuel oil, and lubricants.

If the World War history should

[*Continued on page 54*]

Exports of Crude Oil and Refined Products to Spain Increased with Outbreak of Civil War in 1936

Figures in barrels; from *Minerals Yearbook*

YEAR	Crude Oil		Gasoline		Gas Oil & Fuel Oil		Total Crude Oil, Gasoline & Fuel Oil
	To Spain	Percent of Total Export	To Spain	Percent of Total Export	To Spain	Percent of Total Export	
1934	.....	..	899,000	3.8	655,000	2.5	1,540,000
1935	.....	..	2,113,000	7.4	455,000	1.7	2,568,000
1936	37,000	0.0	2,056,000	7.2	1,252,000	3.6	3,345,000
1937	134,000	0.1	823,000	2.2	301,000	0.7	1,258,000
1938	.....	..	2,095,000	7.8	731,000	4.3	2,826,000

Note:—Spanish Civil War covers period from July 17, 1936 to January 26, 1939.

Highly important is the use of motorized units for rapid movement of troops back of the front lines.

Modern artillery likewise is motorized to a large extent.

Shown here are some views of peace time maneuvers of the United States Army and Navy. Larger quantities of petroleum products also will be consumed by neutral nations, as they enlarge their forces under arms to be "ready for action" in case they are drawn into the conflict.

Photos of Army Maneuvers by C. Ekmark, San Antonio

Where Will Warring Nations

By WILLIAM V. GROSS, Foreign Editor

SINCE all the nations now engaged in the European war are lacking an adequate oil supply for their peace-time consumption, the question of obtaining and transporting petroleum products is an acute military problem. Likewise, its final solution will be of vast importance to the oil industry; as this will determine what particular regions are to benefit most from the increased demand created by war.

Most of the oil to be consumed must be carried to its destination by tankers. Consequently, tankers will be in great demand. The necessity of avoiding transportation routes that will involve exceptional risks from enemy crafts will cause numerous important shifts in oil trade channels.

Look to U. S.

Naturally, when oil is mentioned one thinks of the United States, which produces 60 percent of the world's annual supply. This country is prepared to supply "plenty of oil," in recent years having suffered from an acute problem of over-supply. Likewise the country has the largest refining facilities in the world, and warring nations will want their petroleum in "a ready-to-use" condition. The few refineries in France, England and Germany are in danger of being bombed, and it takes time and men to refine oil.

The United States is in a much better position to supply oil today than it was during the World War. Crude oil reserves of the nation are at an all-time peak, totaling 17-1/3 billion barrels as compared with approximately 5 to 6 billion barrels in 1915, the number of producing wells have been doubled, stringent proration is being practiced in all major producing states with one exception. Refineries are twice as numerous and have a capacity 400 percent greater than during the World War. Pipe line systems have been increased materially; loading docks are many times the rating 25 years ago.

Since there is no question of the volume and refining capacity being located in the United States, the only problems existing for those desiring its oil is that of getting it to the war front and the possibility of the government including it under the restrictions imposed by its neutrality act.

Oil Shipped from These California Docks for Use in Japan-China War

This aerial view taken at a height of 1000 feet shows oil tankers at the Union Oil Company's marine loading terminal in the Los Angeles Harbor. This shows only a fraction of the area which was used during 1938 to load more than 31,000,000 barrels of fuel oil for the use of the Japanese navy. Looking toward San Pedro, this air view shows entrance channels through which dozens of foreign tankers ply every week, loaded with thousands of barrels of needed fuel. In extreme right lower corner is a portion of the Hancock Oil Company's loading terminal and a small bottom taking on a load.

No U. S. Embargo

No restrictions on the export of oil or its products to belligerent nations are imposed under the president's neutrality proclamation, arms embargo or subsequent orders, but a prohibition upon such business may be adopted if, in the president's discretion, it appears necessary to broaden the list of war materials and products.

Issued under the provisions of the Neutrality Act of May 1, 1937, the embargo proclamation of September 5 contains the so-called minimum list of arms, ammunition, war vessels, tanks, airplanes and parts; and chemicals, gases and high explosives.

The law, however, empowers the president definitely to enumerate the implements of war which may be prohibited exportation, but he may not include raw materials or certain commodities, such as wheat. While the so-called minimum list is all that has been em-

Obtain Their Oil?

bargoed in previous proclamations (that issued during the Italian invasion of Ethiopia in 1936 and during the Spanish war in 1937), there is a possibility that further products may be banned at some future date because of the widespread theatre of the new European conflict.

The only restriction placed upon oil was made in the formal proclamation of neutrality, in which the enlistment of men for the military or naval services of belligerent nations was prohibited and rules laid down for the furnishing of facilities for the vessels of belligerents and their use of our ports and waters.

Among the 17 activities specifically dealt with in that proclamation, the president forbids the "dispatching from the United States, or any place subject to the jurisdiction thereof, any vessel, domestic or foreign, which is about to carry to a warship, tender or supply ship of a belligerent any fuel, * * * shipped or received on board within the jurisdiction of the United States."

The transportation problem from the United States involves the risk of crossing the north Atlantic Ocean.

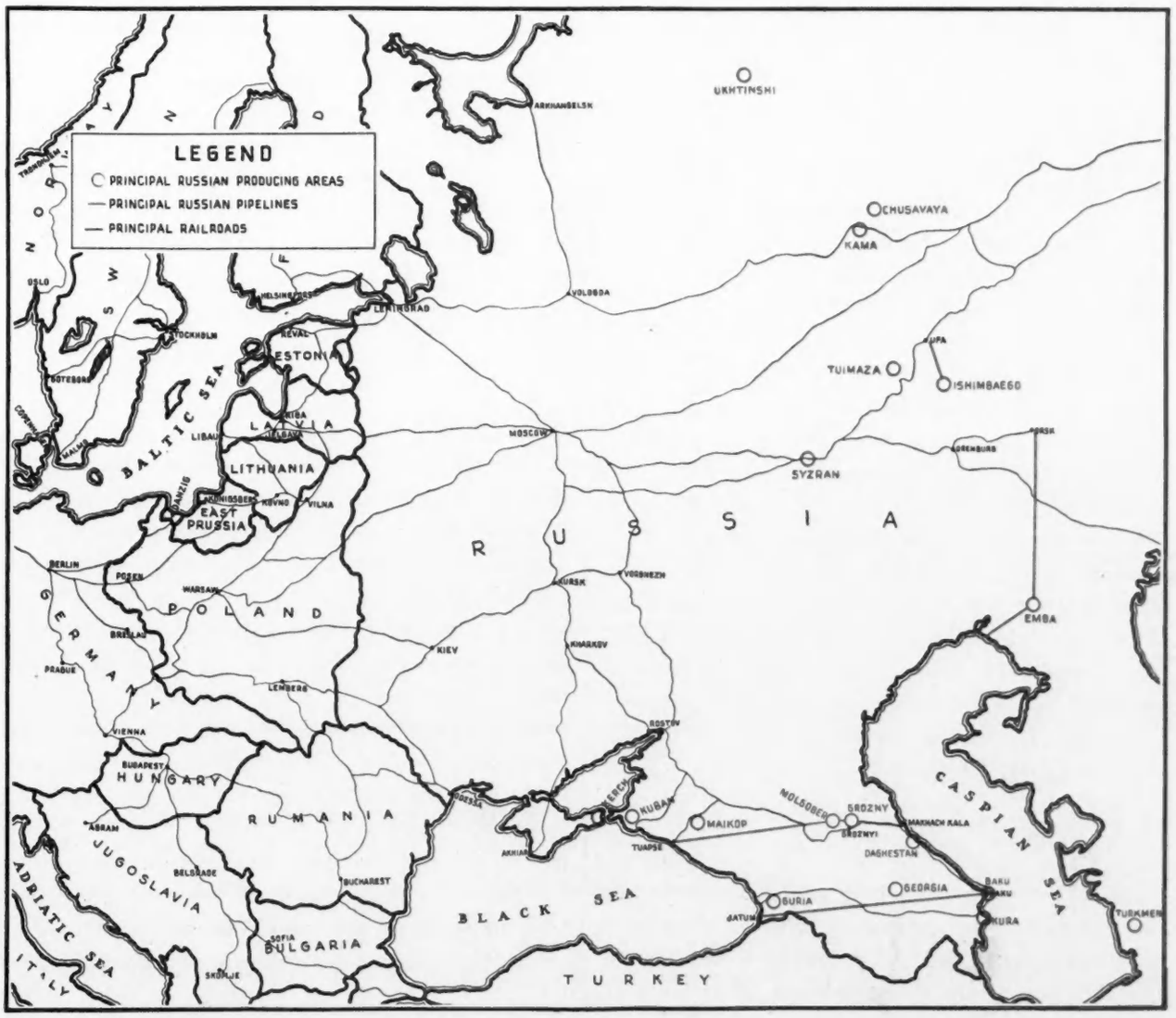
English-French Routes

Because of the acknowledged superior naval power of Great Britain and France, and the fact that their location also gives them

[*Continued on page 60*]

If U. S. S. R. Can Produce the Oil, It Can Reach Germany

Crowflight estimates of distance oil would have to travel out of Russia to get to Germany: Grozny to Moscow, 950 miles; Moscow to Leningrad, 375 miles; Moscow to Konigsberg in East Prussia by rail via Dvinsk in Latvia and through Lithuania, 675 miles; by tanker from Leningrad to Stettin, Germany, where the Oder River empties into the Baltic, 800 miles; Ishimbaevo fields to Moscow, 550 miles; tanker route from Batum to Constanta, Rumania, 650 miles. The accompanying map shows principal Russian producing districts, pipe lines and railroads, and their relationship to Germany.



As We See It . . .

BUGABOOS ARE FADING

EVENTS of recent weeks indicate that the oil industry is growing up. In fact it might not be an exaggeration to say that it has reached the age of discretion.

It does not take a long memory to trace the development from the days of "sour-water geology" and "protection-acreage" leasing; precipitate drilling and over-the-crown-block completion, and storage in earthen tanks. Or in refining from when "straight-run" was the best fuel and automobile oil had to be made from different crudes for winter and summer. Step has been kept with advancements in engines, and we have come a long way from the hand-cranked four-cylinder automobile to the high compression of the modern airplane engine, and from the "Beaumont oil" that reluctantly was adopted by railroads and a few venturesome plants in places where coal was hard to get, to the specification fuels that make the fires in homes and ships and power the fastest trains. Reminiscence would look upon this advance as romance, and full long has the romantic idea persisted. But science and not flights of fancy have been responsible, and giving up this fallacy of the romance of oil is a big step in crystallizing the fact that this is a business and not any more a Pantagruelian gamble. "Liquid gold" is disappearing from the vernacular along with the sluice-box methods that have given way to the less spectacular but more certain way of milling the quartz.

BUT putting on long pants, it seems, only changes bugaboos to windmills. Chief of these have been recurring periods of redundance and famine, and the fear of them—and always a tendency to over expand. The idea of quick and spectacular profits that inspired the pioneers and fired the imagination of the uninitiate, has persisted so long that it is hard to level out on the idea that the business has a future under present prevailing conditions. But that seems to be coming.

HAVING recently found with some surprise that burdensome stocks of crude oil do not exist, the industry currently is awakening to the fact that its surplus supply of gasoline also is a fetish. That leaves but the burden of reserves proven underground, excessive completion rates and the purported flood of oil that potentially could be produced from existing wells. On long range view, this reserve is but security for future operation and should be less feared than that another and better form of heat and power may be invented.

ANOTHER hold-over from the pioneering days is the lust of volume as against profit—barrels rather than gallons. In a field where salesmanship never has been called upon to stimulate demand, the merchandising effort all has been put to getting the competitors' business, with the result that we have such absurdities as selling gasoline at the refinery gate at prices higher than the same is offered hundreds of miles away. Buying in a market where the price is set to preserve the existence of stripper wells —the least efficient producers—selling is in competition with the purveyors of the cheapest produced. Accused of monopoly though they are, the giants of the industry maintain their volume by meeting the lowest price of the most obscure competition. Current result is mounting volume and narrowing profit. That this can and will be changed is inevitable.

—J.K.R.

High Rod Stress in Deep Pumping Costly

By RICHARD V. JAMES,
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IT seems axiomatic that high stress results in damage or failure. Conversely the author believes that high stress is the only important cause of failure. If these statements are true it is quite important for us to be able to say that this stress is high and this material will not give long service, or that this stress is low and may be increased without impairing service. In order to do this it is necessary to understand the behavior of the material under the type of loading being considered, and to be able to calculate accurately the maximum or at least the significant resulting stress. Unfortunately we are not able to do this even for such a simple element as an oil well sucker rod.

Our usual formula, (P/A = S), load divided by area equals stress, gives only the average value of the load per square inch, and gives us no information as to the maximum intensity of stress within the bar, even when the load is definitely known. Although a sucker rod is a very simple structural element the determination of the maximum and minimum loads is not a simple matter. "Weighing the well" rather definitely determines the loading cycle on the polished rod, and the bottom-hole dynamometer gives a fair indication of the load conditions at the plunger. Between these two points are several thousand feet of slender, flexible, elastic rod subjected to various conditions of loading of which very little is known.

When the load is applied uniformly and only a small number of times, we may say definitely that if the value of load divided by area is equal to, or greater than, the yield strength of the material, the stress is high and damage results. This is true largely because yield stress is determined from the same formula using a load applied slowly for a single application. For the usual S.A.E. 4615 material this value of stress is ordinarily about 65,000 pounds per square inch, indicating that a ⅞-inch diameter rod should support up to 39,000 pounds, or a ¾-inch rod should support up to 28,750 pounds without damage. Failures are quite frequent in ⅞-inch sucker rods of this material when the dynamometer shows loads of 22,000 pounds or less, and the maximum load on the ¾-inch rods has supposedly been reduced in at least the same ratio.

To account for this disparity the layman has looked at the peculiar fracture, noted that it shows no reduction of area as is common in the ordinary tensile failure, and that the break has a peculiar brittle appearance, and has attributed the failure either to faulty material or has said that the material crystallized under repeated stress. Faulty material in the sense of internal flaws, "dirty steel," etc., is rare enough to be neglected as a primary cause of failure.

Figure 1 (a) shows a longitudinal section of a sucker rod before loading, and Figure 1 (b) shows the nature of the material at the fracture after failure under re-

Pumping Series Article No. 20

Discovery of the causes of critical stresses and methods for eliminating such conditions will greatly improve sucker rod performance

peated loadings. Obviously there has been no change in the crystal structure of the material due to the loading. The term "crystallized" is a misnomer when used as the reason for failure. Consequently engineers and metallurgists have adopted the term fatigue failure as being more accurate and descriptive.

Fatigue Failure

Since the material is crystalline to begin with, and some of the crystals are hard and strong and others are weak and yielding, the intensity of stress can not well be uniform over the entire cross-section. This lack of uniformity may be intensified by variation in the size of grains, strains due to hardening, and surface discontinuities such as notches, dents, scale, and corrosion pits, etc., usually called "stress raisers." Under the application of a load of sufficient magnitude, the stress at some point in the cross-section reaches a critical value and some internal adjustment must be made. The resulting adjustment does not affect the strength of the bar under static load and the damage (if it may be called damage), is sub-microscopic in magnitude.

Repeated applications of this load cause the damage to spread until slip bands develop in the highly stressed grains. These slip bands join to form cracks which serve to further intensify stress concentration and the process continues rapidly to failure. Thus the surface of a fatigue fracture shows a smooth bright portion in the vicinity of the initial crack, shading into a rough or granular appearing area. The smooth portion has probably been smoothed by abrasion during the progress of the failure, while the rough portion indicates the material remaining when it was no longer able to sustain a single application of the load.

Endurance Limit

As indicated above, the tensile strength of the material gives us no very reliable indication of the value of the material under repeated loadings, and the other usual physical properties have been no better. In order to describe the value of the material under such conditions the term endurance limit was invented. This term is usually defined as the value of the maximum stress that can be repeated an indefinitely large number of times without causing failure. If no qualifying term is used, it is assumed that the applied stress is completely reversed. That is, the cycle of stress varies from a maximum value in tension to the same value in compression. This is usually determined by using a polished specimen mounted and loaded as a rotating beam.

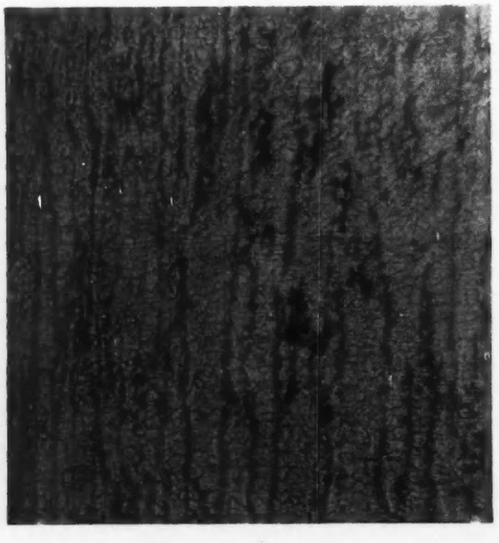
Values of endurance limit determined by applying alternately direct tensile and compressive loads are apt to be considerably less than those obtained from the rotating beam test. The value sometimes used for the endurance limit under completely reversed axial stress is two thirds[1] that obtained in reversed bending. The endurance limit is also an average stress calculated from the condition of loading, and the value is therefore affected by all the stress raisers previously mentioned, namely: grain size, heat treatment, surface finish, nature of the surrounding medium, and the way in which the loading is applied. It may be varied also by manipulation of the loading cycle.[2]

Effect of Grain Size

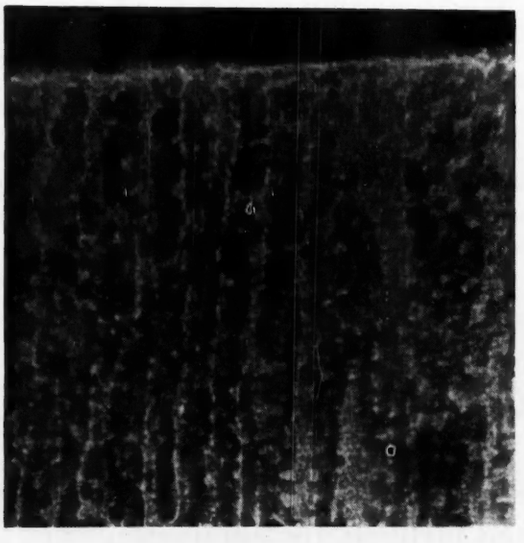
From our hypothesis of fatigue failure we expect the stress distribution in a material made up of large irregular grains or crystals to show a much greater variation from maximum to minimum than in a fine grained material. Consequently the maximum stress occurring will be much higher than the average. Such a material should

FIGURE 1

Grain structure of a rod before and after loading. (X 100)



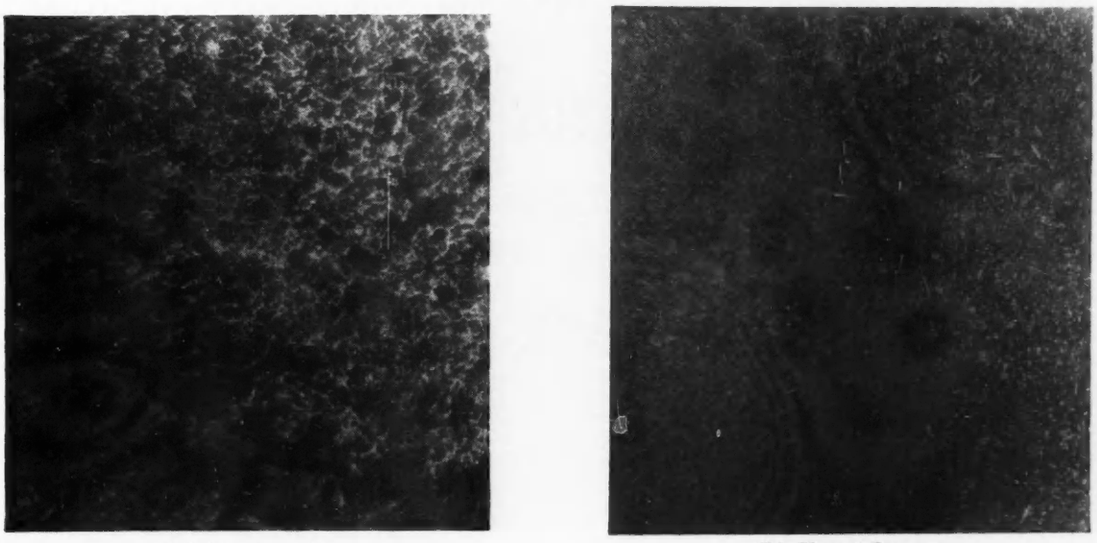
(a) Before loading



(b) After failure by fatigue

FIGURE 2

Drill pipes of identical chemical composition. (X 100)



(a) Good service **(b) Unsatisfactory**

then have a lower endurance limit than a fine grained material if the other properties are the same. Likewise, we would expect the coarse grained material to be more seriously affected by surface discontinuities such as nicks, or scale and corrosion pits, than the fine grained material. Experience has proved this to be generally true. Figure 2 shows micrographs from two drill pipes of identical chemical composition. The one marked (a) gave good service in the field, while (b) was quite unsatisfactory.

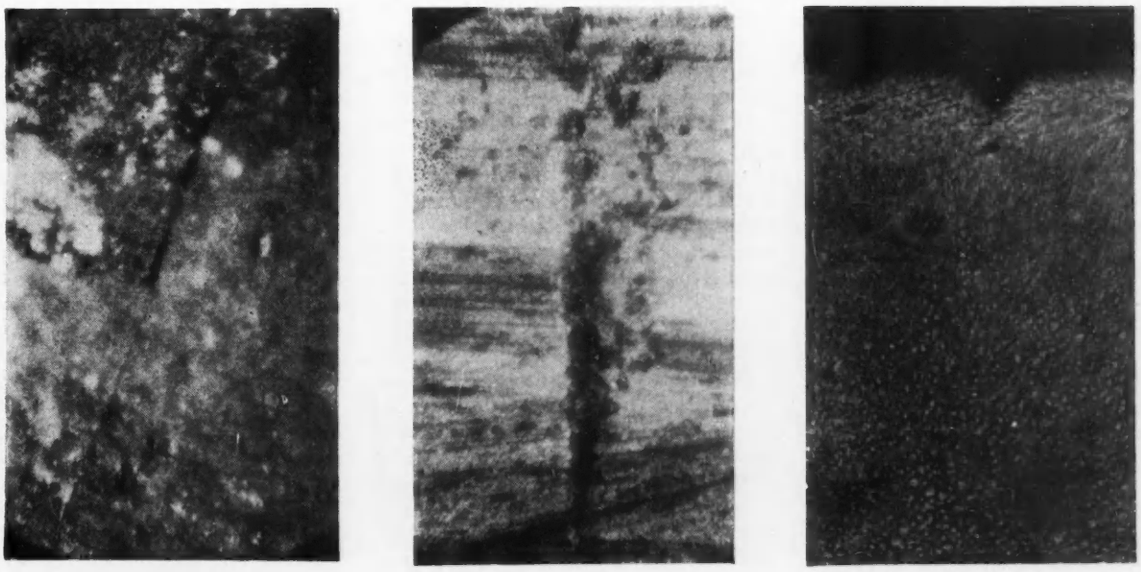
Unfortunately materials cannot be compared on the basis of grain size alone because of the variation in other properties. Also a grain size that would be considered small in one type of material would be called coarse in another.

Heat Treatment

The grain size of a given steel is controlled largely by the heat treatment used in the process of

FIGURE 3

Mill scale pits



(a) Surface check in the scale. **(b) Surface view of the defects under the scale.** **(c) Cross-section of the scale pit.**

FIGURE 4
Cross section of a corrosion pit

manufacture. Strength and ductility are both dependent in some measure on grain size. Thus, we find that the heat treatment that increases the strength and toughness of steel, usually raises the endurance limit in air. The increase in endurance limit however is not usually in proportion to the increase in strength. Unfortunately, we often find that the heat treatment that gives the best strength may not perform as well as either the hot rolled, annealed, or normalized material when subjected to corrosive conditions, or when tested with notches, holes, dents, or other surface defects such as are found in service.

Surface Finish

The sucker rod in the well has a great many surface "stress raisers" that serve to reduce its fatigue life materially. These may be divided into groups consisting of defects in manufacture, accidental, due to use and abuse in handling, and defects caused or aggravated by the surrounding medium (corrosion and embrittlement).

In the first group there are rolling mill marks of infinite variety, mill scale and scale pits, and the threads and shoulders at tool joints. It is believed that the effects of threads and shoulders have been amply allowed for in the design of the joints. The other discontinuities may have effects even more serious than threads or notches.

Figure 3 shows the nature of the damage in a rod having a heavy, tight, hard, black scale. Figure 3 (a) is a micrograph showing the surface of a rod where a piece of the scale has checked off, and the scale pit in the rod continuing along the transverse check line. Figure 3 (b) shows the scale pit in detail after the flakes of scale have been ground away, and Figure 3 (c) shows a cross-section view of the pit with an incipient crack starting from it. There were a large number of such incipient cracks in this rod any one of which would probably have resulted in failure within a short time. The rod had failed at a similar defect.

Figure 4 shows a cross-section through a corrosion pit near the point of failure in another rod.

It has been supposed that the fatigue failure of most rod couplings began at the root of the threads and progressed toward the outside. A close examination of a number of coupling fractures casts doubt on the accuracy of that assumption. Figure 5 (a) shows a surface crack on a coupling. The striations are marks caused by wear. Figure 5 (b) shows the cross-section of this crack. It starts at the bottom of a corrosion pit and progresses inward perpendicular to the surface. There were four such cracks in this coupling, the depth averaging 29 percent of the thickness of the wall. It is quite possible that the effect of the corrosion pits was aggravated by the box slapping against the wall of the tubing. The pits in the case hardened exterior, having the effect of the mark of a glazier's diamond on a pane of glass, and the slapping having the effect of the taps with which the glazier starts the break. At any rate, the effect of the surface defects, even though they were almost microscopic, was more damaging than the threads. Apparently this is a common condition.

The infinite variety of form and degree of these various surface defects makes it impossible to assign them any definite value. In addition the magnitude of the effects varies with the nature of the material, its heat treatment, etc.

Some tests show that the effects of surface discontinuities can be minimized by cold rolling,[4] or by pre-stressing to the yield point. As a rule these gains have been small.

Table 1 gives comparative test data on a number of materials from which we may get an idea of the importance of several forms of surface discontinuities or stress raisers. This shows that for these materials in the hot rolled or annealed condition the endurance limit, where surface defects are present, ranges from 48.4 percent to 80 percent of the endurance limit of the polished specimens, with an average of 59.8 percent. For the heat treated steels the range is from 34.5 percent to 56 percent with an average of 43 percent of the endurance limit for the polished specimens. Most of these materials are not used for sucker rods so

TABLE 1

Effects of surface defects on endurance limit

MATERIAL	Se Endurance Polished	Se' Endurance Defect	Se'/Se	Nature of Defect	Heat Treatment	Investigator
C. O. 75 Mn. 0.5	110,000	52,000	.473	Galvanized	N. Q. & D.	Shelton & Swanger[5]
C. O. 75 Mn. 0.5	118,000	....	....	....	Cold Drawn	Shelton & Swanger[5]
S. A. E. 2330	80,000	31,000	.388	Notched	N. Q. D.	Oberg & Johnson[6]
S. A. E. 4130	42,000	25,000	.596	Notched	Annealed	Oberg & Johnson[6]
S. A. E. 4130	86,000	30,000	.349	Notched	N. Q. D. @ 1100°	Oberg & Johnson[5]
S. A. E. 4130	114,000	53,000	.465	Notched	N. Q. D. @ 900°	Oberg & Johnson[6]
S. A. E. 3140	64,000	36,000	.512	Fillet r=0.022"	Hot Rolled	T. J. Dolan[3]
S. A. E. 3140	64,000	31,000	.484	Hole d=0.04"	Hot Rolled	T. J. Dolan[3]
S. A. E. 3140	90,000	36,000	.40	Fillet r=0.022"	Q. 1510° D. 920°	T. J. Dolan[3]
S. A. E. 3140	90,000	31,000	.345	Hole d=0.04"	Q. 1510° D. 920°	T. J. Dolan[3]
S. A. E. 1035	.....	....	.80	Mill Scale	Hot Rolled	R. E. Peterson[7]
C. O. 39 Ni. 1.82 Cr. 0.92	75,000	42,000	.56	Corrosion due to 60 days in salt water	.....	McKay & Worthington[8] (McAdam)
C. O. 45 Mn. 2.0	.....	....	.46	Mill Scale	Spring Steel	Peterson[7]
C. O. 45 Cr. 1.0 Si 1.0	.....	....	.42	Mill Scale	Spring Steel	Peterson[7]

these values are more of a suggestion of what may be true than for anything else. However, it is safe to say that under the best conditions the endurance limit of the rod is not more than 80 percent of the laboratory value and it does not seem unreasonable to expect the usual value to be not more than 60 percent of the laboratory value. Or, stating it another way, it may be said that the actual maximum stress caused by surface discontinuities is from 1.25 to 1.67 or more, times the average stress calculated by the formula.

Surrounding Medium

It is probable that the effect of the surrounding medium on endurance limit is closely allied to the surface finish. The surrounding fluid has a tendency to cause surface pits which may rapidly deepen into cracks as shown in Figures 4 and 5. Since the corrosive action is continuous and the relative movement of the adjacent particles of the rod tends to prevent the formation of a protective film, the endurance limit of specimens tested in liquids is much lower than for those tested in air.

Obviously the time element also is important in corrosion fatigue because of the continuity of the corrosive action. For this reason it is difficult to properly correlate the results of corrosion fatigue tests from various laboratories. Some have defined corrosion endurance limit as the maximum stress that can be applied through 10,000,000 cycles at 30 cycles per minute (a period of 231 days), others have operated at from 1450 to 1750 cycles per minute for periods of from 30,000,000 to 40,000,000 cycles (from 14 to 16 days). Using the higher speeds and the shorter periods of time about three months of machine time are required for the determination of a single endurance limit, while for the longer period several years of machine time are required for a single determination. It is easy to understand why data on corrosion fatigue is very limited. Table 2 gives some data showing the relative

FIGURE 5

Incipient fatigue failure in a coupling

The coupling was sawed lengthwise in (b) and (c)

(a) Surface view of crack connecting corrosion pits—striations caused by wear.

(b) Cross-section view of crack (X 25).

(c) Cross-section view of crack (X 100).

values of endurance limit for several materials.

The low values of the endurance limits in sulfide brine have been attributed to the sulfide embrittlement of the steel added to the corrosive effect.

Tests by T. J. Dolan[3] to determine the effect of notches and holes (surface defects) on the corrosion endurance limit of S.A.E. 3140 steel in fresh water, seems to show that the combined effect is very nearly the product of the fillet effect and corrosion effect taken separately. For the corrosion effect alone the polished specimen in water showed an endurance limit of 53.2 percent of that in air, while the fillet specimen in air had a value 56.3 percent that of the polished specimen. The fillet specimens in water gave a value 29.7 percent of the air endurance limit which is very nearly equal to $0.532 \times 0.563 = 0.299$. Likewise for the specimens containing holes, the value in water was 25 percent that of the polished specimens in air. The products of their respective values $0.532 \times 0.485 = 0.258$. Pending further confirmation and in the absence of specific information on the combined effects of corrosion and existing surface imperfections, this would seem to be a convenient assumption.

Applying this assumption to the S.A.E. 4615 material quite widely used for sucker rods, the field endurance would be $33{,}100 \times .6 = 19{,}800$ pounds per square inch for brine, and $19{,}900 \times 0.6 = 11{,}940$ pounds per square inch in the sulfide brine. The approximation is rather crude since the factor 0.6 is an assumption based on rather meager evidence. Attention also must be called to the fact that the values given were for reversed bending stresses whereas the stresses in the rod are not bending stresses and are not supposed to be completely reversed.

Range of Loading

Since the stresses are not reversed completely, the range of stress as well as the maximum stress is important. As the difference between the maximum and minimum stress decreases, the effect approaches that of a steady stress, therefore the maximum allowable stress increases. Reasoning on this basis, the yield point of the material becomes the limiting value of maximum stress when the range of stress is zero.

Using a method suggested by Soderberg[12] for calculating maximum and minimum stresses we find: For S.A.E. 4615 steel in salt water that a maximum stress of 50,000 pounds per square inch will be the endurance limit when the minimum stress is 20,000 pounds per square inch; and that the endurance limit may be 52,000 pounds per square inch when the minimum stress is 26,000 pounds per square inch.

Since the polished rod loads quite frequently have a ratio of minimum to maximum of between 0.4 and 0.5 in the 6500-foot wells of the Oklahoma City field, we should expect to find maximum stresses of $50{,}000 \times 0.6 = 30{,}000$ pounds per square inch to $52{,}000 \times 0.6 = 31{,}200$ pounds per square inch to be the service endurance limit for rods of this material.

A study of the service records on a number of these wells shows quite contradictory evidence on this point. In the upper rods of the wells where the loadings shown by the dynamometer may be assumed as correct we find frequent failures at stresses of 29,000 pounds per square inch or less before 3,000,000 cycles have been reached. One failure at 181,400 cycles and 33,300 pounds per square inch was noted.

On the other hand several strings of rods showed a service of more than 10,000,000 cycles at stresses up to 34,650 pounds per square inch with no breaks. Since 10,000,000 cycles of stress has been arbitrarily assumed in determining the endurance limit at slow speeds under corrosive conditions, we see that average stresses even up to 34,000 pounds per square inch are not excessive under ideal conditions. The limit as calculated would seem to be somewhat on the safe side.

Service Conditions

The large number of failures occurring before the expected fatigue life has been reached and at loads less than the maximum suggested, seems to indicate that factors other than load may be quite important in the life of the rod. This group of stress raisers, roughly classified as due to use and abuse in the field, are probably more important than some of those already discussed. The significance of their various elements has not been evaluated.

Rods probably are often severely damaged by dropping them into the well to seat the pump, or when the string is dropped by a break, or they may be severely overstrained in pulling the pump. Pins and couplings may be damaged by forcing reluctant threads or by tightening too tight with long handled wrenches. And there are a multitude of hazards due to handling which have been ably discussed in previous articles.[13, 14]

The loading on the string of rods is also much different from that usually assumed in calculating stress. Even at the polished rod where the well has been weighed with an accurate dynamometer, there is no guarantee that the load remains as indicated. Small changes in speed of operation, pump action, etc., may cause appreciable changes in the loading cycle. At the other points in the rod it is very difficult to predict the loading with any degree of certainty.

A large number of rod breaks

TABLE 2

Corrosion endurance limits

MATERIAL	Se Polished Air	Se Fresh Water	Se / Se	Se Salt Water	Se / Se	Se Sulfide Brine	Se / Se	Heat Treatment
S. A. E. 4130[9]	70,100	.....	....	26,900	.384	14,100	.201	Q. & D.
S. A. E. 4615[9]	48,000	.....	....	33,000	.682	19,900	.41	Q. & D.
Wrought Iron[9]	30,400	.....	....	19,600	.645	16,400	.54	
S. A. E. 1035[9]	40,600	.....	....	24,600	.607	10,600	.261	Hot Rolled
C. 0.16 Cr. 18. Ni.[10] 8	50,000	50,000	1.	25,000	.5	.....	....	
Cr. 17. Ni.[10] 25	54,000	45,000	.833	34,000	.63	.....	....	
A[11]	54,000	29,000	.538	.....	....	.....	....	Hot Rolled
B[11]	50,000	24,000	.48	.....	....	.....	....	Hot Rolled

NOTE:—Chemical composition of A is C. 0.08; Mn. 0.27; P. 0.145; S. 0.020; Si. 0.80; Cu. 0.41; Cr. 1.01.
Chemical composition of B is C. 0.08; Mn. 0.43; P. 0.104; S. 0.022; Si. 0.162; Cu. 1.07; Ni. 0.54.

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This advertisement appears in The Saturday Evening Post for September 9th. Miles of Smiles for every manufacturer and user of Timken Bearing Equipped products.

occur at considerable distances below the top, indicating that all critical conditions of loading are not given by the dynamometer.

A person watching a train of cars starting up will observe a jerk starting at the engine tender being transmitted to each car in turn for the entire length of the train. The last car is jerked forward and bumps into the car ahead starting a wave of bumps along the train. This wave of bumps will reach the tender diminished in intensity and be reflected again as a wave of bumps etc. The same phenomenon takes place in the string of rods. The recurrent jerk is referred to as a wave of stress or as the harmonic of the rod.

The speed of transmission of the stress impulse is assumed to be the speed of sound[15] in the rod but the rate at which it diminishes (damping rate) is not well understood. But it may be seen that there may be a critical point (or critical points) of stress and the location of such points would depend upon the operating characteristics of the individual well. It may even be that the stress at some point in the rods is compressive for part of the stroke. Or at any rate the range of stress is much different from that shown on the polished rod.

To this also must be added the effect of lateral vibrations ("whipping") as the load is picked up, and the resultant slapping of the rods and boxes against the tubing. The actual increase in stress due to the bending action involved in the lateral vibration is probably very small. However, its effect would be greatest at or near the ends of the rods due to the stiffening effect of the upsets and couplings.

These elements together with the high frequency of the vibrations may explain the large number of failures near the shoulder of the rods.

Studies covering 168 wells of about 6500-foot average depth were made by two major producing companies in the Oklahoma City field. These wells annually produced 630,000 barrels of fluid, 18.3 percent of which was salt water. The rod breaks averaged 125.9 per month and the total rod replacements for all causes averaged 18,737 feet per month. At this rate 4.866 years would be required for a complete replacement. Or it may be said that the average rod life is 4 years 10.4 months. Obviously a great many rods must serve a longer time than this without trouble. A study of rod records shows that comparatively short sections of the rod strings are responsible for a large percentage of the breaks.

Conclusion

Such being the case, the discovery of the causes of the critical conditions and the elimination of those causes should greatly increase rod performance. This should be true not only because of the reduced breakage; but also because of reduced damage due to dropping and handling. Progress has been made and is being made in this direction through studies of dynamometer charts, operation of pumping equipment and care in servicing and handling of rods and pumps. The manufacturers are attacking the problem from the standpoint of materials better adapted to the type of service and less sensitive to "stress raisers," and methods of manufacture and inspection that decrease the number and effect of the "stress raisers" in the rods. That improved production is possible with the present materials, is indicated by the occasional service of more than a year without a rod break (in rare instances two years), and rod strings in service more than five years with only occasional breaks. The fact that the average stresses in some of these exceptional cases is as much as 33,300 pounds per square inch, indicates that this stress is not too high for some of the commonly used materials. Likewise, average pumping records show that stresses much too high for satisfactory service may be produced by any of a large number of stress raisers, even when the average load is much below that figure.

Acknowledgment

The author wishes to express his appreciation and thanks to the engineers of the producing companies for the use of data from their records and their assistance in collecting material for this paper.

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Importance of Gas in Petroleum Production

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In spite of the fact that natural gas was commercially sought by drilling wells some 38 years before the drilling of the first commercial oil well, since that time natural gas has been the step-child of the petroleum industry. The first natural gas well in this country was completed in the year 1821 near Fredonia, New York, giving a supply of gas estimated to be sufficient for 30 burners.[11] The first oil well was completed in August, 1859, near Titusville, Pennsylvania, by E. L. Drake.

Since that time, by far the largest percentage of the oil and gas wells have been drilled primarily for oil. Wherever oil has been found in commercial quantities, gas in varying amounts has been found with it. Except where the gas could be collected and piped to industrialized or urban sections for power or heating purposes, it has usually been blown to the air or burned. It is estimated[15] that about one half trillion (five hundred thousand million) cubic feet of gas were blown to the air and wasted in 1934, with a total of eight trillion wasted from the start of the oil industry to 1935. In the same year, 1934, 1.633 trillion cubic feet of gas were produced for consumption. In other words, about one fourth of the total gas produced in 1934 was blown into the air or otherwise wasted.

Lack of knowledge of the physical properties and phase relationships of the fluids existing in the oil and gas reservoirs has been one of the major handicaps to be overcome by the petroleum industry in its attempt to bring to the surface a greater portion of the oil present in the reservoir rock. Furthermore, the importance of these factors in conservation must not be overlooked.

In 1929, the American Petroleum Institute Gas Conservation Committee concluded that gas is the chief but not the only expulsive agent in most oil fields, natural water drive being most important of the other agents; that crude oil dissolves natural gas in amounts directly proportional to the gas pressure; that natural gas in solution reduces both the viscosity and the surface tension of a crude oil, the amount of reduction depending on the amount and nature of the gas in solution; that this reduction in viscosity and surface tension makes larger quantities of oil producible at faster rates; and that the reverse of the foregoing is also true and that a waste of gas means a decline in ultimate production.

The same group also suggested that oil should be so produced as to keep in the sand throughout the life of the field the greatest percentage possible of the original gas energy. They found that neither in the laboratory nor in the field could repressuring reproduce original conditions. No one method of production was found applicable to all fields and conditions.

Forces in Production of Oil

When a new oil reservoir is tapped by the drill, the energy for the production of that oil due to the differential in pressure between the sand face in the well and any other point in the formation may be present in two or more of the following forms:[4] gas pressure, hydrostatic pressure (water drive), and gravity. Of these three, gas energy is by far the most important. The energy furnished by hydrostatic pressure becomes increasingly important as the rate of withdrawal of the oil and gas is held as nearly equal volumetrically to the rate of edgewater encroachment as is feasible, still keeping up a commercial rate of production. When this is done, little gas energy needs to be expended in moving the oil from the formation to the well bore. Gravity plays a relatively unimportant part in delivering the oil from the formation to the well until the energy due to gas pressure and/or hydrostatic pressure has been exhausted. Then probably the amount of production made available by gravity alone is commercially unimportant except in cases of very thick producing formations of relatively high porosity and permeability. There are many fields where natural water drive has never played an important part in the production of oil, either because it was not present or because the rate of production of oil and gas far exceeded the rate of edgewater encroachment.

Static Conditions in the Formation

In a virgin oil reservoir, gas may be present in three conditions:[61] (1) free gas, segregated in relatively large pockets; (2) gas dissolved in the oil; (3) occluded gas—exceedingly small bubbles and films mixed with the oil in the formation. The state in which the gas is found may depend largely on the amount of gas, the formation temperature and pressure, and the physical conditions of the reservoir rock itself. In order for a given field to contain free gas in the form of a gas cap, there must be some means for vertical travel of gas bubbles in the formation.

Cores taken from oil sands have shown repeatedly the non-uniformity of the formation. This is particu-

larly true in the vertical direction, for usually, as the sands are laid down, there are variations vertically in the character of the material deposited, forming the bedding planes and shale breaks which result in stratification of the formation. Production data have shown that usually the shale breaks have cracks or porous sections which will allow some vertical travel of oil and gas.

Methods of Sampling Reservoir Fluids

If experiments are to be made to determine the physical properties and phase relationships of reservoir fluids, it is necessary to first obtain fairly accurate samples of these fluids. There are two common methods of obtaining these samples:

1. Surface sampling: (a) tapping the flow lines through an elbow between the well and separator and inserting a piece of small diameter pipe upstream through which samples may be withdrawn.[37-30] (b) Removal of samples from separator discharge lines in proportion to the amount of each produced from the well and return to formation temperature and pressure.[13]

2. Subsurface sampling: The purpose of subsurface sampling is to obtain a representative sample of the reservoir fluid as it exists at the sampling point and to bring it to the surface, keeping it intact until tested. The valves of these subsurface samplers are of the knife edge type. Once closed, they are held in the closed position as the sampler is withdrawn by the differential between internal and external pressures, the valves seating more tightly the nearer the sampler gets to the surface. The valves are held in the open position during the run into the hole allowing the well fluid to pass clear through the device. When the sampler reaches the predetermined sampling point, it is raised and lowered several times in order to wash out traces of fluids which may have been carried down with it from higher points in the well. The valves are then closed either by a timing device[31] or by a messenger sent down the line from the surface.[14]

Subsurface sampling has the distinct advantage that the samples can be used directly for laboratory studies. However, when flow conditions are varied, the composition of the fluid produced probably will vary and different samples must be taken for each set of flow conditions encountered. Subsurface sampling has the disadvantages, according to Sage and Lacey,[43] of interfering with the normal producing operations of the well and also the fact that in sampling a more or less mechanical mixture of oil and gas, such as exists in all probability in flowing wells, the sampler may tend to fill selectively with one or the other of the phases and thus not bring to the surface a truly representative sample of the fluids being produced.

The latter objection might also hold for any method which requires tapping into a flow line between well head and separator, particularly for the withdrawal of the comparatively small samples required for laboratory use.

On the other hand, surface sampling by taking samples from the separator at the well head has certain advantages as suggested by Eilerts and Schellhardt[13] as follows:

"If samples of liquid and gas could be taken from the separator at a well flowing steadily from an 'ideal' reservoir, remixed in the proportions of the measured ratio of gas to hydrocarbon liquid, and brought to solution equilibrium at formation temperature and pressure, the resultant phases would be identical in composition and properties with the corresponding phases in the reservoir at formation pressure and temperature. A well is considered to be flowing steadily when the mass-time rate of production of each component has reached a constant value; and, for the purposes of the hypothesis, a reservoir is considered ideal when it is of such extent or nature that formation pressure and temperature do not change in the time required for the rate of fluid flow to reach the steady state after mechanical adjustments at the well are made.

"The continuous change in composition and properties of the phases along the path of flow from the remote sections of the reservoir, where static formation pressure obtains, to the sand face and up the flow string to the separator does not restrict the hypothesis. It is sufficient that at every point along this path of steady flow the pressure and temperature have fixed values and there is no accumulation or diminution in the mass of a component present. In the over-all view, with steady flow and an ideal reservoir, all material entering the separator must be withdrawn without fractionation from the homogeneous reservoir phases which are in equilibrium at the static formation pressure and temperature.

"In practice, steady flow, as previously defined, usually is not attainable and a reservoir can not fully satisfy the ideal requirements. The hypothesis applies at a limit, however, which usually may be so closely approached that samples obtained will be dependable for use in interpretation of reservoir phase relations."

This, of course, applies particularly well to the type of wells known as "distillate" or "condensate" because of the very high gas/oil ratio. It becomes less and less important as the gas/oil ratio decreases. The lower the gas/oil ratio, the better adapted the well becomes to subsurface sampling technique and the more consistent will be the results obtained.

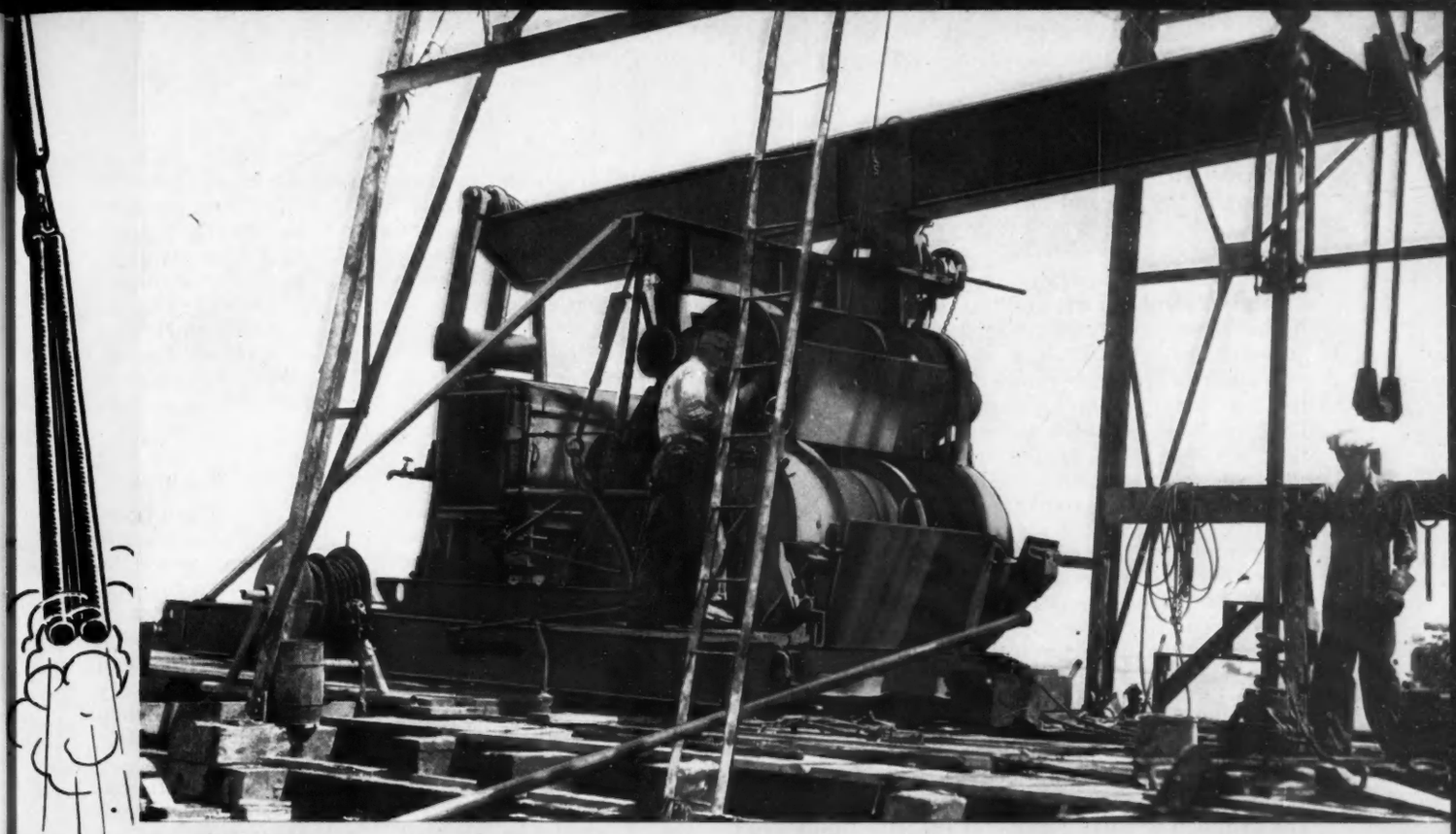
Gas Liberation from Saturated Oil Samples

Theoretically, there are two methods by which gas may be liberated from an oil/gas solution: differential liberation and flash liberation. Differential liberation requires the complete removal of all vapor from the oil as rapidly as it is formed. The nearest practical approach to this is probably batch distillation. Flash liberation requires that all the gas remain in intimate contact with the liquid until the maximum temperature of liberation is reached and that the material then be placed in a flash chamber and all the vapors released from the liquid be kept in contact with it until equilibrium is reached. Combinations of the two may be used in any variety.

Considerably more vapor is obtained and less liquid remains as a result of flash liberation than of differential liberation.

This information is of interest to the producer and engineer because the above described processes for liberation of gas from an oil/gas solution, according to Lindsly,[30] may be considered to be directly analogous to the liberation of gas from crude oil in the various phases of oil production. As gas and oil are withdrawn from the producing formation, the pressure is gradually reduced resulting in a process of differential liberation of gas from the oil in the sand, the gas moves along toward the region of lower pressures and does not remain in contact with the oil from which it was liberated. However, when the oil and gas enter the well and travel toward the surface, we have an intimate contact of oil and gas which rather closely approximates the conditions of flash liberation.

As stated above, more gas or vapor is released from the solution by flash liberation than by differential liberation. This shows the advantage of stage separation of gas from the oil at the surface at high pressure wells, for stage separation is a swing back in



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the direction of differential liberation and gives an increase in the amount of oil obtained from the separators with a consequent decrease in the amount of gas discharged.

This point is illustrated in a paper by Katz[21] in which he calculates the mol fractions of various gases in the vapors removed at separator and stock tank from crude oil by single stage separation compared with the mol fractions removed by two stage separation. In single stage separation, the separator is operated at 34.7 pounds per square inch absolute and the stock tank at atmospheric pressure both a 80° F. For two stage separation, a high pressure separator operating at 315 pounds per square inch absolute is placed in the line preceding the one operating at 34.7 pounds per square inch. A material balance by converting mol fraction and cubic feet of the various vapors to pounds shows 42.4 pounds of vapor removed from the separator and 0.8 pound from the stock tank per barrel of stock tank crude for single stage separation. For two stage separation, this becomes 21.2 pounds from the high pressure separator, 11.1 pounds from the low pressure separator and 3.0 pounds from the stock tank. This is a total of 43.2 pounds of vapor from single stage separation and 35.3 pounds from two stage separation per barrel of stock tank crude. The final gravity of the stock tank crude is also a measure of the separator efficiency. The final gravity from single stage separation would be 38.8° A.P.I. as compared with 40° A.P.I. from two stage separation. This would indicate a saving of 7.9 pounds of material and an increase of 1.2° A.P.I. in the stock tank oil, which also means that in the case of two stage separation there would be less material removed from the reservoir to produce one barrel of stock tank oil than would be the case for single stage separation. It may also be of interest to note that 7.9 pounds of material saved is the weight equivalent of more than 1¼ gallons of gasoline.

Critical Properties of Hydrocarbon Mixtures

Relatively little is known today of the critical properties of complex mixtures of hydrocarbons though studies of critical phenomena have been carried on during the past century. Most of the work to date has been done on the properties of pure substances or simple mixtures. It is very hard to carry over much of the information gained in this way into the field of petroleum where the mixtures are not only very complex but show great variation in composition in different localities and even vertically between different zones in the same locality.

Taylor[57] defines critical temperature as follows: "There is some temperature for each gas above which the gas cannot be liquefied. This temperature is called the critical temperature." The critical pressure of the gas is its vapor pressure at the critical temperature. Patten and Ivey[37] apply this to a mixture as follows: "In a system containing two or more components, the critical temperature and pressure are the temperature and pressure at which the liquid and gas phases have identical physical properties and identical compositions." According to Katz and Singleterry,[25] "The critical temperature of a mixture refers to the mixture passing from the liquid state to the region of uniform fluid with slight temperature rise, and the critical temperature must be the maximum temperature at which a bubble point will exist for the mixture."

Perhaps this will be understood more easily if we refer to Figure 1. Here we have a phase diagram of one mixture of the methane-propane system, containing 30 mol percent methane and 70 mol percent propane.

The boundary curve of this figure was plotted directly from the data of Sage, Schaafsma and

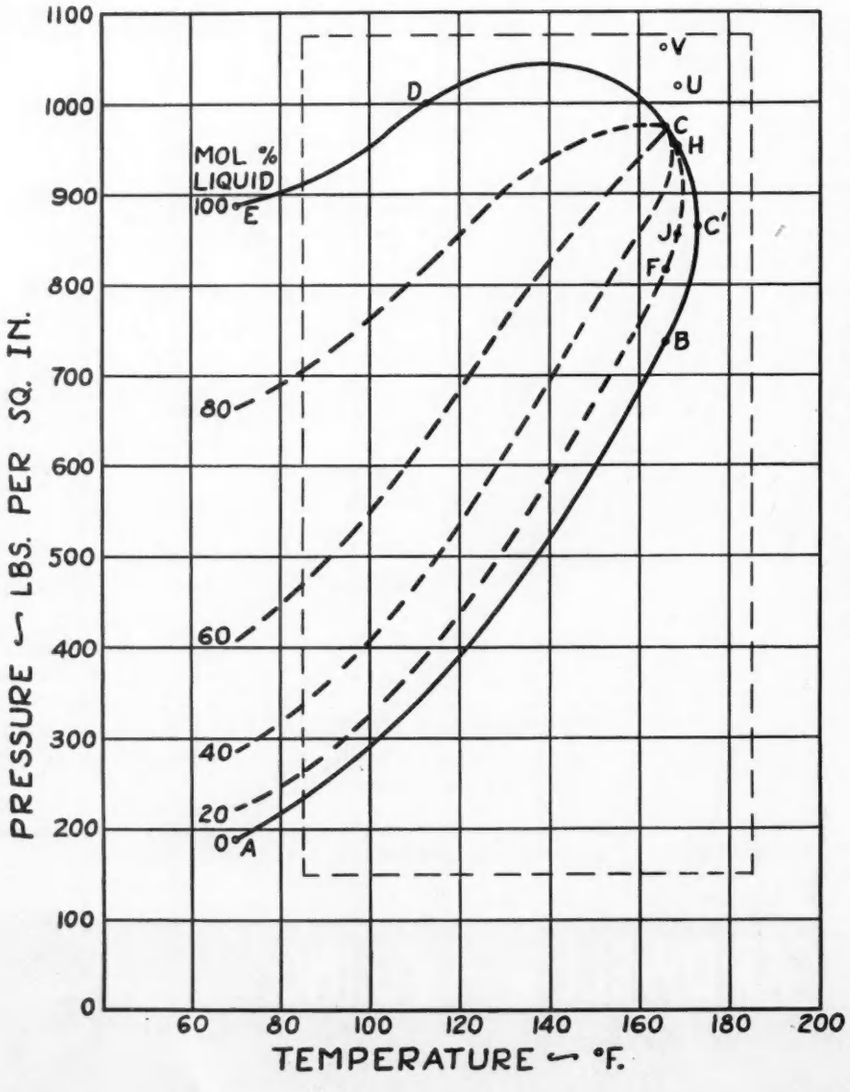

FIGURE 1

Phase diagram of a 30% methane—70% propane mixture. (Calculated from data of Sage, Schaafsma and Lacey.)

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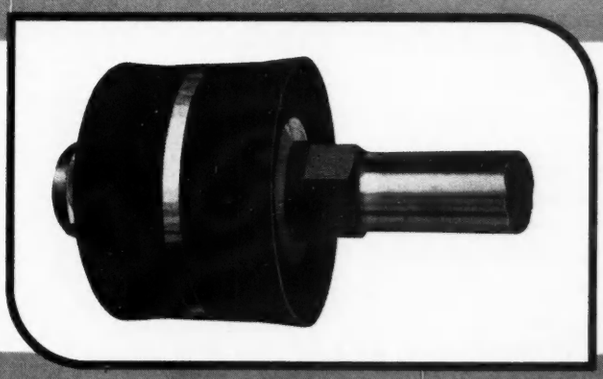

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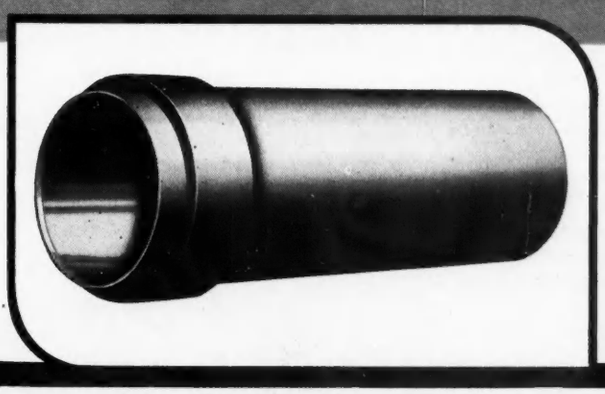

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Lacey.[48] The intermediate mol percent liquid lines were calculated by the writer from the above mentioned data using the method described by Katz.[21]

The line ABC'HC is the line of dew point or complete vaporization. Above and to the left of it, inside the region bounded by ABC'HCDE, we have varying amounts of liquid and vapor in equilibrium with each other. Below and to the right of ABC'HC is the region of complete vaporation where no liquid can exist. The line EDC is the vapor pressure or bubble point line. Below this line is the region of varying amounts of liquid and vapor in equilibrium with each other and above it is the region of total or complete liquefaction. Bubble point may be defined as the temperature and pressure at which the first bubbles of vapor begin to show up in the liquid phase.

The point C is the critical point of this mixture. The critical temperature is 165.9° F. and the critical pressure 968 pounds per square inch. Above this temperature, the mixture can not be completely liquefied no matter what the pressure. The point B is the cricondentherm (critical condensation temperature) of the mixture and may be defined as "the highest temperature at which any liquid may be condensed from a particular gaseous mixture."[10] The cricondentherm for this mixture of methane and propane is at 172.6° F. and 864 pounds per square inch.

Inside the area bounded by the curve ABC'HCDE, two phases may exist in equilibrium with each other at any specified temperature and pressure. Outside this area only one phase can exist at any specified temperature and pressure. A continuation of the constant temperature line from BC through V is the boundary, if any can truly be said to exist, between the liquid phase on the left and the vapor phase on the right. The physical properties of these two phases at the critical temperature are identical so that in passing from one to the other no change in phase is apparent to the observer. This will probably be more understandable if an example is chosen. Starting with a mixture of 30 mol percent methane and 70 mol percent propane at a temperature of 85° F. and 1075 pounds per square inch and following the dashed line, as may be seen from Figure 1 the mixture will be a liquid under these conditions. If this liquid is heated at constant pressure to a temperature of 185° F., no apparent change will have taken place except a gradual decrease in density. If the pressure is now slowly released isothermally (at constant temperature), the mixture will gradually expand just as a gas would expand. Stopping this expansion at a pressure of 150 pounds per square inch and letting the mixture cool at constant pressure to 85° F., at this point it is definitely in the vapor phase and yet at no time has there been any evidence of two phases present at one time as would be shown by two layers in the mixture or the formation of bubbles. However, if this mixture is compressed isothermally back to the starting point, at first a little liquid forms, then increasing amounts until a state is reached where all of the mixture is again a liquid. The mixture passes from the liquid to vapor phase at the critical temperature or the "region of uniform fluid."[25]

Isothermal compression of the mixture of methane and propane from the point F where there is 20 mol percent liquid and 80 mol percent vapor would bring complete liquefaction of the mixture at the point C but it would pass immediately into "the region of uniform fluid just as liquefaction was completed."[25]

The area BC'HCF is a region peculiar to phase diagrams of mixtures and can not be found in those of pure substances. It is a region above the critical temperature where varying amounts of liquid and vapor may exist in equilibrium with each other. It is this region which gives rise to the phenomenon of retrograde condensation. This can be illustrated by starting at a point U at a temperature of 168° F. and 1017 pounds per square inch in Figure 1. Here the material is in the vapor phase. If this mixture is expanded by decreasing the pressure isothermally, the point H is encountered at which liquid begins to condense rapidly from the mixture up to about 30 mol percent of liquid. Further isothermal reduction of pressure brings it to the point J where the condensate has already begun to vaporize again. Continued reduction along the same line causes the condensate to continue to vaporize until, below a pressure of about 770 pounds per square inch, the material has returned completely to the vapor state. This is the phenomenon of retrograde pressure condensation.

The same type of phenomenon may be encountered in starting with a liquid at the point D which is a point on the 100 mol percent liquid line above the critical pressure of the mixture. If the mixture is heated at constant pressure, a portion of it passes into the vapor phase. However, with continued heating to a temperature of about 132° or 133° F., the material will again return to the liquid state. This is retrograde temperature condensation.

We are particularly interested in the phenomenon of retrograde pressure condensation from the standpoint of what are known as "condensate" or "distillate" wells. A question has arisen as to the determination of just what constitutes a condensate well since the passage of House Bill No. 266,[58,55] by the Forty-fourth Legislature of the State of Texas defining a gas well as one which produces more than one hundred thousand cubic feet of gas per barrel of oil and the United States District Court for the western district of Texas ruled that oil "should lie in the bed or reservoir as oil and as oil be produced from it."[8,55] Therefore, the necessity arises for determining the original state of the reservoir fluid in wells from which both gas and condensate are being produced.

Eilerts and Schellhardt,[13] in their report on a "combination" well in the East Texas-North Louisiana region, make no attempt to generalize. They report the preliminary results of field and laboratory tests on only one well in one particular field. In these studies, they were unable to determine conclusively the phase relations in the reservoir. Tests showed that both liquid and gas were present simultaneously in the well bore. Tests on the subsurface liquid sample having a saturation pressure of not more than 200 pounds per square inch below the formation pressure indicated that part of the liquid produced from the well exists in the reservoir in the liquid phase and that the remainder is the result of retrograde condensation during the process of production.

Patten and Ivey[37] made equilibrium bomb tests on material from a large variety of condensate wells. They concluded that when the liquid produced is water white all, or very nearly all, the material leaves the reservoir in the vapor phase; that the material in most condensate reservoirs exists in a condition very close to the retrograde dew point and that it is possible to calculate the true gas/oil ratios of wells producing a dark condensate, if the composition of the fluids produced from the condensate and the low ratio oil wells in the same field are known.

Attempts at repressuring condensate fields after

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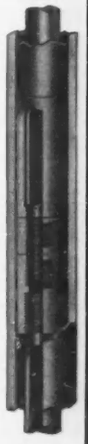

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the field pressure has been allowed to drop below the point at which the condensate separates in the formation have proven unsuccessful. Laboratory tests had shown that this was to be expected and that it is much easier to form the condensate than to revaporize it.

The commonest method for obtaining the critical temperature of a pure substance is to heat it in a glass tube until the meniscus between the phases disappears showing that the density of the two has become the same.[2] A different method was used by Sage and Lacey.[45] In the equilibrium cell, the height of the liquid at any time was measured by means of a vertical micrometer screw with a short piece of fine platinum-iridium wire stretched horizontally between two needle points on its lower end. A small current passing through this wire heated it slightly. As contact was made with the surface of the liquid in the cell, the wire was cooled, resulting in a sudden increase in the resistance of the wire. The surface of the liquid could thus be accurately determined. The compositions of the two phases could be determined by withdrawal of samples. The densities of the two phases were measured by use of sensitive balances in both phases in a density balance apparatus under conditions identical to those in the equilibrium cell. The density balance consisted of a beam with a copper plummet on one end and an aluminum plummet on the other having equal weights but different volumes, consequently having different buoyancies. The force required to balance the beam is a function of the density of the medium in which the balance is immersed. Two repelling solenoids are used to restore the beam to balance, and the current required by the solenoids is a measure of the density of the medium.

Equilibrium Constants and Hydrocarbon Mixtures

We may define the equilibrium constant of any component of a hydrocarbon system as the ratio of the mol fraction of that component in the vapor phase to the mol fraction of the same component in the liquid phase at any given temperature and pressure. Mathematically, this can be expressed as follows:

$$K = y/x \qquad (1)$$

where: y = mol fraction of a component in the vapor phase

x = mol fraction of a component in the liquid phase

Souders, Selheimer, and Brown,[54] Katz and Brown,[23] Hill and Lacey,[17, 18] and Katz and Hachmuth[24] have published equilibrium data which can be very useful to the petroleum production engineer. The first work of this kind was done on simple mixtures of pure substances. The work is now being extended to the complex mixtures found in petroleum. To date, most of the applications of this type of data to production problems have been based on information gained from analysis and examinations of surface samples of oil and gas. However, Buckley[7] presents a method of calculating the behavior of oil and gas mixtures in various stages of production from hydrocarbon analysis and other laboratory data obtained from subsurface samples. The data required for such calculations are similar in nature to those obtained by Lindsly[31] and Eilerts and Schellhardt.[13]

The purpose of these calculations is not to replace field data but to correlate and predict them on the basis of information gained in the laboratory. It is possible by calculations to determine the effects of variations in operating technique on each of the following:[7]

1. The gas/oil ratio resulting from liberation of the dissolved gas,
2. The composition and gasoline content of the liberated gas,
3. The composition and gravity of the residual oil,
4. The amount and composition of the gas liberated upon flashing the oil from the separator to the stock tank,
5. The shrinkage of the oil in passing from the reservoir to the stock tank.

Physical Properties of Hydrocarbon Mixtures

Due to the very large number of hydrocarbons existing in crude petroleum, the problem of their separation and the study of the physical properties of the individual hydrocarbons would seem to be a discouraging one. Relatively few of this large number of compounds have been isolated and studied in their pure form. Of the rest, not even their chemical constitution is known, nor have any of their physical properties been determined. However, there is a ray of hope to be seen in the fact that some unexpected correlations of important physical properties have been found so that it is now possible to predict such properties for a given compound on the basis of a limited knowledge of its character.[29] Some of the more useful physical properties and their methods of correlation follow:

Vapor Pressure

There are many possible methods of correlating vapor-pressure relationships of hydrocarbons, but one of the best from the standpoint of usefulness in engineering is that of Brown,[6] on paraffin hydrocarbons. The chart developed by Brown is reproduced by Nelson.[36] Another very useful method, particularly from the standpoint of arriving at other values of vapor pressure of a paraffin hydrocarbon from one known value, is that of Cox[9] or one of its modifications. In this method, temperature is plotted on an arbitrary scale against the log of the pressure. This was found to give a series of straight lines which, when extrapolated, all converge to a common point.

Vapor Density

Density may be defined as the mass of a substance per unit volume. Therefore, density is an inverse function of volume. When the pressure is very low, the vapors of all hydrocarbons behave like perfect gases and follow the law,

$$PV = nRT \qquad (2)$$

and

$$n = \frac{w}{M} \qquad (3)$$

The following equations may be found useful in many gas calculations:

$$PV = \frac{w}{M}RT \qquad (4)$$

or

$$P = \frac{w}{V}\frac{RT}{M} \qquad (5)$$

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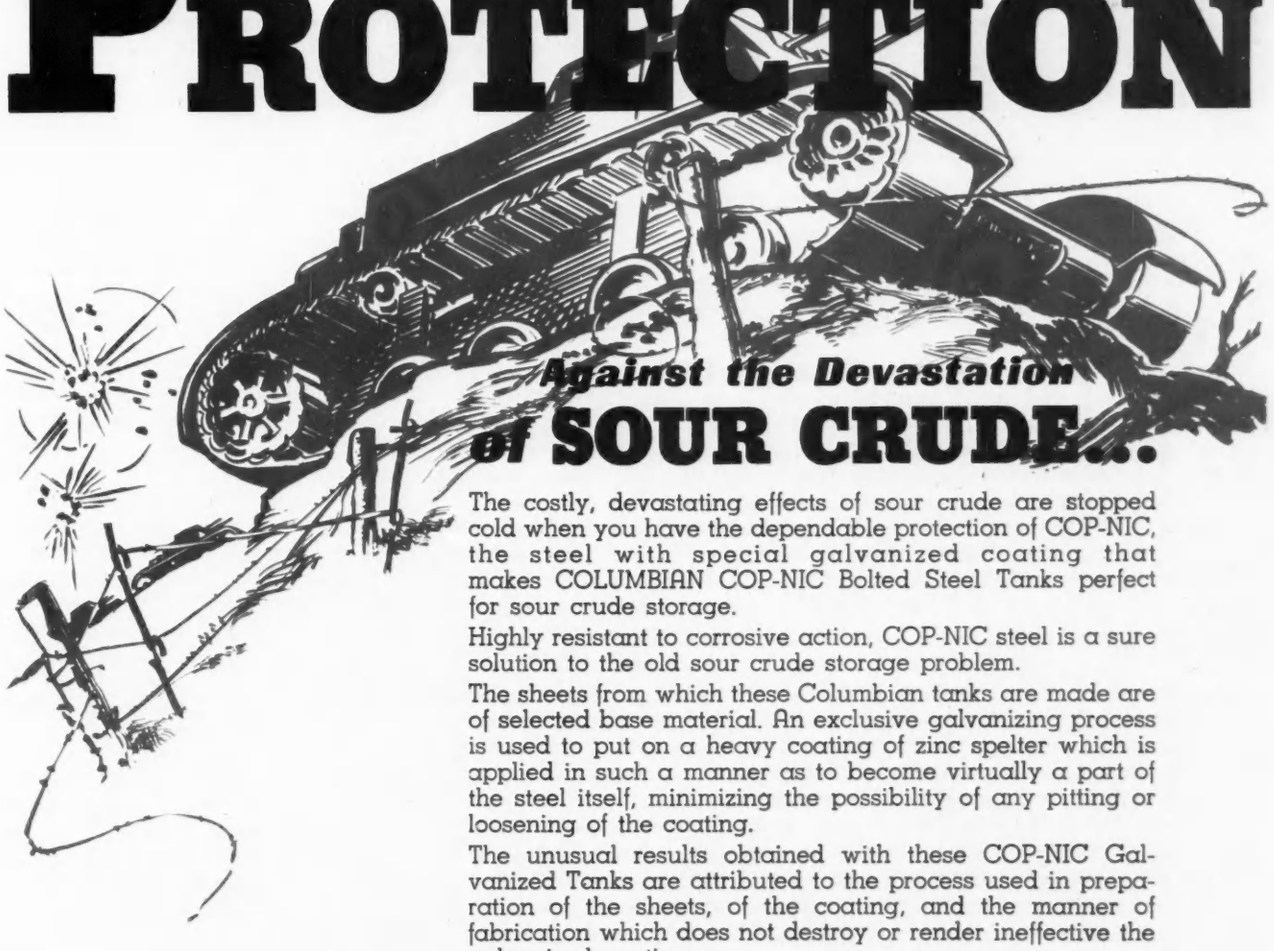

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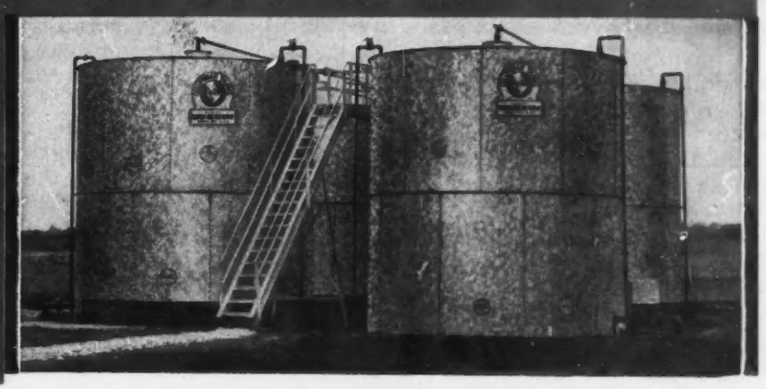

(Right) A battery of Columbian COP-NIC Tanks in a sour crude district.

$$\text{but} \quad \frac{w}{V} = d \tag{6}$$

$$\text{therefore: } P = d\frac{RT}{M} \tag{7}$$

$$\text{and} \quad d = \frac{PM}{RT} \tag{8}$$

nomenclature:

P = pressure, pounds per square foot
V = volume, cubic feet
n = number of mols of hydrocarbon under consideration
T = absolute temperature = °F. + 460
R = gas constant = 1544
w = weight, pounds
M = molecular weight
d = density, pounds per cubic foot

As the pressure on a vapor is increased, deviations which are more and more marked as the pressure rises become noticeable. For hydrocarbon vapors at normal temperatures, these deviations are in the direction of smaller volumes than those predicted from the perfect gas law and thus greater densities. It is fairly well established now that the relationship between these properties of volume, temperature, and pressure can be correctly represented by using the gas law equations and introducing a correction factor μ,

where:

$$PV = nRT \tag{9}$$

It has been found that μ is a function of the reduced temperature T_R and reduced pressure P_R of the vapor where: $T_R = T/T_c$ = the ratio of the temperature at a particular point to the critical temperature and $P_R = P/P_c$ = the ratio of the pressure at that same point to the critical pressure. Charts for these values are given by Lewis.[29]

Solubility of Gas in Oil

The solubility of gases in various liquids varies widely with both the composition of the gas and that of the liquid. Usually this solubility is directly proportional to the pressure, following Henry's Law. In other words, the higher the pressure the greater the solubility of gas in oil. This relation gives a straight line. Thus, in general, it is possible to predict the solubility of a particular gas in a certain oil at a chosen pressure, if its solubility is known at a definite pressure. The solubility of a particular gas in a particular liquid cannot be predicted from a knowledge of the solubilities of other gases except in a very general way. In general, gases of one kind are more soluble in liquids of the same kind than in liquids of another kind. For example, hydrocarbon gases are more soluble in crude oil than in water, and air is less soluble than hydrocarbon gases in crude oil.

Probably the earliest reports on the solubilities of natural gases in crude oils were those of Beecher and Parkhurst[3] and Dow and Calkin[12] in 1926. Other investigations by Mills and Heithecker,[35] Lindsly,[30] Sage, Lacey and associates,[27, 28, 42, 44, 47] and Gosline and Dodson[16] followed. Many of these investigators worked at different temperatures and failed to show the variation of solubility with temperature so that it is hard to correlate the data collected by one group with those collected by the others. However, indications are that the composition of the gas used has a greater effect upon results in general than the composition of the liquid which dissolves the gas. For instance, the relative solubilities of methane, ethane, and propane are 1:1, 4½:1 and 21:1 respectively (methane chosen as unity).[27] Beecher and Parkhurst,[3] and Dow and Calkin[12] give some charts showing the effect of temperature upon the solubilities of gases, but the charts are of very limited usefulness. Much work yet remains to be done is this field.

Effect of Gas in Solution on Volume

One of the first recognized effects of gas in solution on crude oil was its effect on volume, i.e., volume lost due to evaporation. Such losses are now very much on the decrease due to improvements in storage equipment and practices. The subject of evaporation losses, together with methods of their calculation, has been quite well covered lately in several articles by Mauney and Vandaveer,[33] Rogers,[39] Ashley,[1] and Bosa.[5] Earlier writings of importance on this subject included the publications of Schmidt,[53] Wiggins,[60] and Mills and Heithecker.[35]

There are other aspects to the subject of effect of gas in solution on volume of petroleum which are of great importance to the engineer. Previous discussion under the heading "Gas Liberation from Saturated Oil Samples" has brought to light the fact that the volumes of oil and gas produced at the surface are no direct measure of the volume occupied by that same material in the formation with the gas in solution in the oil or partly present in the form of free gas in the gas cap. From this arises the question: What is the formation volume? According to Sage and Lacey,[42] formation volume may be defined as the number of unit volumes occupied at a designated temperature and pressure by all the hydrocarbon material associated with one unit volume of oil as measured at 60° F. and a pressure of 14.73 pounds per square inch absolute. Perhaps a better understanding of this is given by the definition of Gosline and Dodson[16] of "formation volume factor" as the "volume occupied by a unit volume of residual crude when in equilibrium with the specified quantity of gas at the specified temperature and pressure."

Formation volumes vary rather widely with variations in temperature, pressure, and gas/oil ratio. However, if these were the only variations, it would be possible with the data available to predict rather closely formation volumes of various mixtures. Unfortunately, as has been shown in so many cases when working with the very complex mixtures of hydrocarbons known as crude oil, it is found that the volumes obtained for any given gas/oil ratio vary, also, with the character of the crude and the gas associated with it. At this time, sufficient data are not available to make any accurate predictions of these relationships for the materials produced in one locality on the basis of a knowledge of the pressure, temperature and volume relationships of the materials produced in another. Gosline and Dodson[16] attempt a correlation of data obtained by them on three gravities of crude oils from wells tapping the same producing sand at different points with data of Sage and Lacey[44] on oil and gas from another section. In general, the correlation is good and indicates the need for much more work along this line.

One of the great values in formation volumes, in addition to giving a clue to better operating conditions, is their importance in the work of estimating reserves. Considerable information on formation volumes has been published by various investigators including Gosline and Dodson[16] and Sage and

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Lacey.[42,43,44] Some uses are illustrated by Katz[21,22] and Schilthuis[52].

Another type of volume which is important from the standpoint of its use in calculations on flow problems and estimation of reserves is the specific volume of the fluid. Specific volume may be defined as the volume occupied by a unit weight of the material at a designated temperature and pressure. The relationship between specific volume and formation volume may be shown as follows:

$$V_s = CV_F \qquad (10)$$

where: V_s = specific volume, cubic feet per pound
C = conversion factor
V_F = formation volume factor

Gosline and Dodson[16] give a chart for values of this conversion factor C for the materials on which they worked. Some of the values and uses of specific volumes are indicated by Schilthuis,[52] Sage, Hicks, and Lacey,[40] Patten and Ivey,[37] Gosline and Dodson,[16] Sage and Lacey,[43,46] and Sage, Webster, and Lacey[51].

Effect of Gas in Solution on Gravity of Crude Oil

Another consequence of the solution of gas in a crude oil is the decrease in specific gravity and increase in A.P.I. gravity due to the addition of lighter hydrocarbons to the body of the oil. The reverse is true in the case of evaporation, resulting in the loss of the lighter ends of a crude oil with an increase in the specific gravity of that oil and a consequent decrease in the A.P.I. gravity. It is from this second standpoint that we are mainly interested, because a decrease in A.P.I. gravity decreases the market value of that oil.

Effect of Gas in Solution on Viscosity of Crude Oil

Viscosity of the oil being produced has a bearing on flow problems from the time the oil in the formation starts to move toward the well until it is delivered at the refinery. Viscosities at ordinary temperatures are easily determinable with routine laboratory viscosimeters of either the Saybolt or the Ostwald type. The Ostwald is to be recommended because it gives kinematic viscosity readings.

The early work by Dow and Calkin[12] on viscosities of gas saturated samples of crude oil at high pressures was done with rather crude, but nevertheless effective, apparatus using the principle of the Saybolt viscosimeter and calibrated against it at atmospheric pressure. The orifice consisted of a short length of capillary glass tubing held in a short pipe nipple by a plug of solder. The time required for a measured amount of the mixture to pass through this capillary was a measure of the viscosity of the oil. The pressure was equalized above and below the capillary by an open by-pass tube connected to the upper oil reservoir above the oil level. The apparatus was used for working pressures up to 250 pounds per square inch. The same principle was used in equipment of a more compact design by Beecher and Parkhurst[3] in their work on the same subject. With their equipment they obtained values at pressures up to 600 pounds per square inch.

The later work of Sage, Lacey, and associates[27,41,44,49,50] was done at pressures up to 300 pounds per square inch in a rolling ball type of viscosimeter. This apparatus consisted of an inclined cylindrical steel tube accurately machined on the inside and fitted with a spherical steel ball of slightly smaller diameter than the tube[27]. When the tube was filled with oil, the ball rolled slowly down the tube due to the close fit. The oil had to flow upward past the ball and the ball moved so slowy that this flow was in the viscous and not the turbulent range. Therefore, the rate of movement was a direct measurement of the viscosity of the oil. The ball was timed between two electrical contacts which were insulated from the rest of the steel tube. The time between the breaking of the upper contact and the making of the lower one was recorded by means of a chronograph operating on the same principle used in recording pressure gauges, flowmeters, thermometers, etc.

The results of such studies are directly applicable to flow problems in the formation, in the casing or tubing, and in high pressure lines carrying saturated oil-gas mixtures.

Dow and Calkin[12] found viscosity reductions up to 19 percent of original at the pressures at which they worked. Beecher and Parkhurst[3] found decreases as great as 50 percent in the viscosity at the pressures at which they worked. They also found that the percentage reduction for a definite volume of gas in a definite volume of oil increased with increases in temperature. In other words, the higher the temperature, the greater the effect of gas in solution in reducing viscosities.

Effect of Gas in Solution on Surface Tension

As long as only one fluid phase is involved in problems of fluid flow, the surface tension of that phase is not important. However, as soon as two or more fluid phases occur, the surface forces between those phases become important. This is particularly true in all flow problems in the oil reservoir where the pressure has been lowered enough to allow small bubbles of gas to come out of the oil. This results in what is known as the Jamin effect. This effect is discussed by Wilson in a section of "The Function of Natural Gas in the Production of Oil."[34]

In studying the effects of gas in solution on the surface tension of a crude oil, the capillary rise method was used by Beecher and Parkhurst[3] and Swartz.[56] A good diagram of the equipment used is shown by Swartz. He used a piece of capillary glass tubing supported in a chamber designed for high pressures and having a window of one-half inch thick plate glass through which the readings were taken. Swartz carried his experiments to several times the pressures used by Beecher and Parkhurst. However, over the same pressure ranges, the check was good considering the difference in analyses of the oils and gases used and the difference in temperatures at which the runs were made.

In the work of Beecher and Parkhurst and that of Swartz, the experiments were run on surface samples of crude oils resaturated with surface samples of gas. Jones[20] obtained reservoir samples of crude saturated with gas. The apparatus used by him was specially designed using a glass frame suspended from one end of a magnetized beam supported upon a knife edge. The beam was balanced by use of a solenoid. The current required for balancing was a direct measure of the surface tension and was measured by a meter and controlled by a rheostat. The curves for surface tension versus saturation pressure obtained by Jones on the bottom hole samples of Iranian crude have about the same slope as those obtained by Swartz, and Beecher and Parkhurst, although the surface tension measured at atmospheric pressure was lower for the Iranian crude than for the American crudes.

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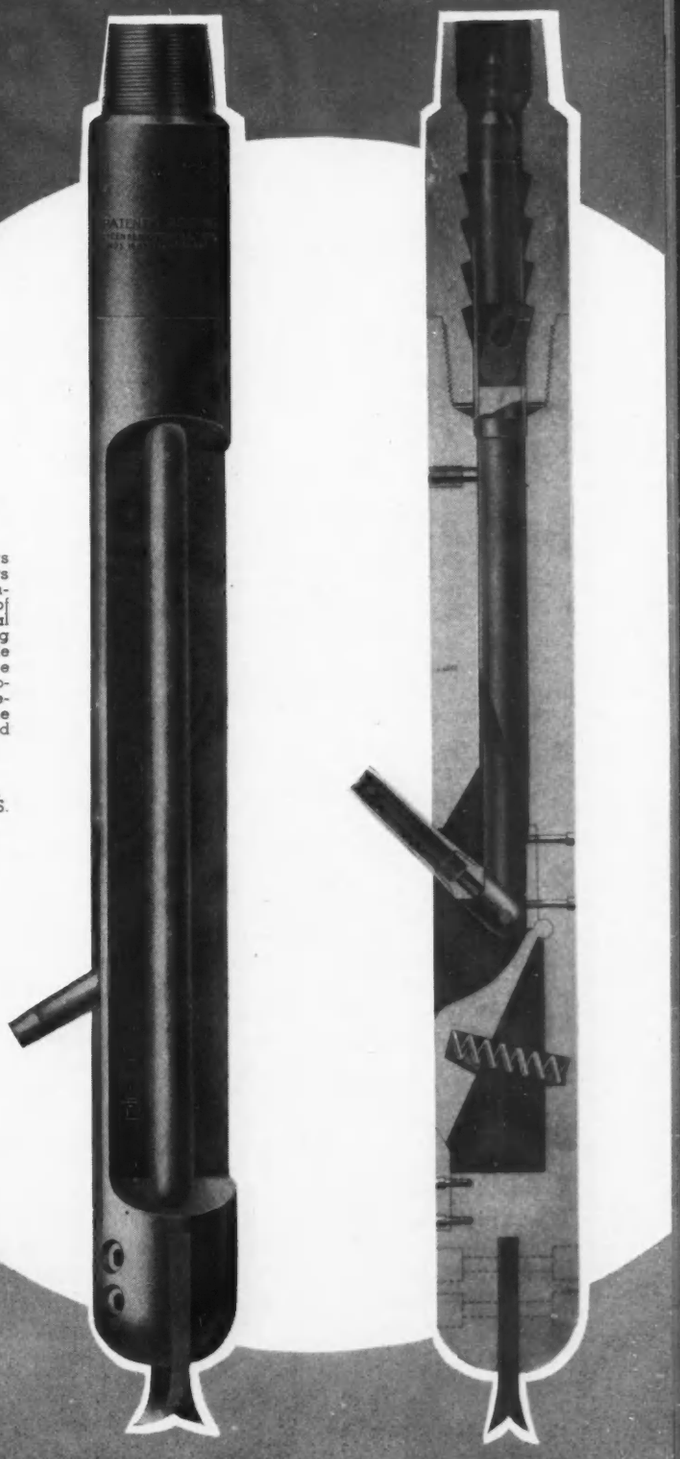

Outside view shows core tube as it enters side wall upon downward movement of drill stem. Sectional view shows resting position after sample is taken, ready to be recovered after upward drill stem movement returns core tube to normal deflected position.

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Measurements of surface and interfacial tensions of oil-water systems have been carried out at atmospheric pressure by Livingston[32] on many samples of Texas crude oil. He finds an average of 30.4 dynes per centimeter and variations of as much as ± 11 percent from that average. The average found for interfacial tensions was 20.4 dynes per centimeter with a standard deviation of 7.3 dynes per centimeter.

Hocott[19] examined a number of samples of reservoir fluids for interfacial tensions between the oil and the water. Because of a scum forming at the oil-water interface it was found that the glass frame and capillary methods of measurement of interfacial tension would not be satisfactory so the drop-weight method was used. In this method, a fresh interface was continuously formed. The dropping tip was of stainless steel and extended below the surface of the oil. The water was slowly passed through the tip and drops formed on the end. As the gravitational pull on a drop became greater than the combined force of the interfacial tension plus the buoyant effect of the oil, the drop would fall, passing between two electrodes and making a contact which sounded a buzzer. The volume of the drop was known from an accurately calibrated displacement pump used in forcing the water through the tip.

Determinations were made on subsurface samples from several fields at the temperature at which each sample existed in the formation and at pressures from above the reservoir pressure down to atmospheric. An interesting result of this work was the finding that the interfacial tension increased with the pressure on the system up to the saturation point of the oil and then decreased as the pressure was raised beyond that point.

A large amount of oil may also be held in the formation due to capillary forces, which are dependent on surface tension. As the surface tension is decreased, much of this oil may be made available which would not otherwise be recoverable.

Rates of Solution

In connection with the solubility of gases in oils and all the benefits deriving from it, there arises another point of great importance in repressuring and pressure maintenance work, i.e., the rates of solution. The rates of solution of hydrocarbon gases in quiescent liquid hydrocarbons are much slower than might be imagined. This has been shown by the work of Pomeroy, Lacey, Scudder and Stapp[38] followed by that of Hill and Lacey[17,18] together with a progress report by Lacey[26] to the American Petroleum Institute which sponsored the work.

After making certain assumptions, theoretical equations were derived giving the rate of solution of a gas into a liquid as a function of time.[38] The original differential equation was:

$$\frac{\partial Q}{\partial t} = \frac{-DA\partial c}{\partial x} \qquad (11)$$

which integrated to

$$Q = C_s A l \left[1 - \frac{8}{\pi^2} \sum_{m=1}^{m=\infty} \frac{e^{-D\left(\frac{2m-1}{2l}\right)^2 \pi^2 t}}{(2m-1)^2} \right] \qquad (12)$$

Where:

Q = quantity of solute which has passed a given point
C = concentration
C_s = concentration at saturation point
A = area at right angles to direction of flow
l = depth of liquid
D = diffusion constant
t = time
m = number of the term in the summation
e = base of naperian logarithms = 2.7183
x = distance in direction of flow

Fortunately, when the gas has not reached the bottom of the liquid, equation (12) simplifies to

$$Q = 2C_s A \sqrt{\frac{Dt}{\pi}} \qquad (13)$$

Equation (13) holds true up to 50 percent saturation. From (13) we see that Q plotted against the square root of time should give a straight line. This was found to be the case. For the case when the gas has reached the bottom of the liquid and the concentration at the bottom is increasing, we must return to the general equation (12), but again we are fortunate for as the liquid approaches saturation with the gas all but the first term become very small in proportion to the first term and we have

$$Q = C_s A l \left[1 - \frac{8}{\pi^2} e^{-Dt\left(\frac{\pi}{2l}\right)^2} \right] \qquad (14)$$

From equation (14), where the quantity of solute at saturation is Q_s:

$$Q_s = C_s A l \qquad (15)$$

therefore:

$$Q/Q_s = 1 - \frac{8}{\pi^2} e^{-\frac{Dt\pi^2}{4l^2}} \qquad (16)$$

However, equations (14) and (16) are only good for saturations of 50 percent and over. From equation (16), the time to half saturate a quantity of Bartlesville crude oil to a depth of one foot with methane where $D = 6.6 \times 10^{-5}$ square feet per hour may be calculated as follows:

$$\frac{1}{2} = 1 - \frac{8}{\pi^2} e^{-\frac{6.6 \times 10^{-5} t \pi^2}{4 \times 1^2}}$$

$$\frac{1}{2} = \frac{8}{\pi^2} e^{-16.3 \times 10^{-6} t} = .8706\, e^{-16.3 \times 10^{-6} t}$$

$$\log_{10}(2 \times .8706) = 16.3 \times 10^{-6} t \times \log_{10} e$$

$$.241 = 16.3 \times 10^{-6} t \times .434$$

$$t = 3.41 \times 10^{3} \text{ hours}$$

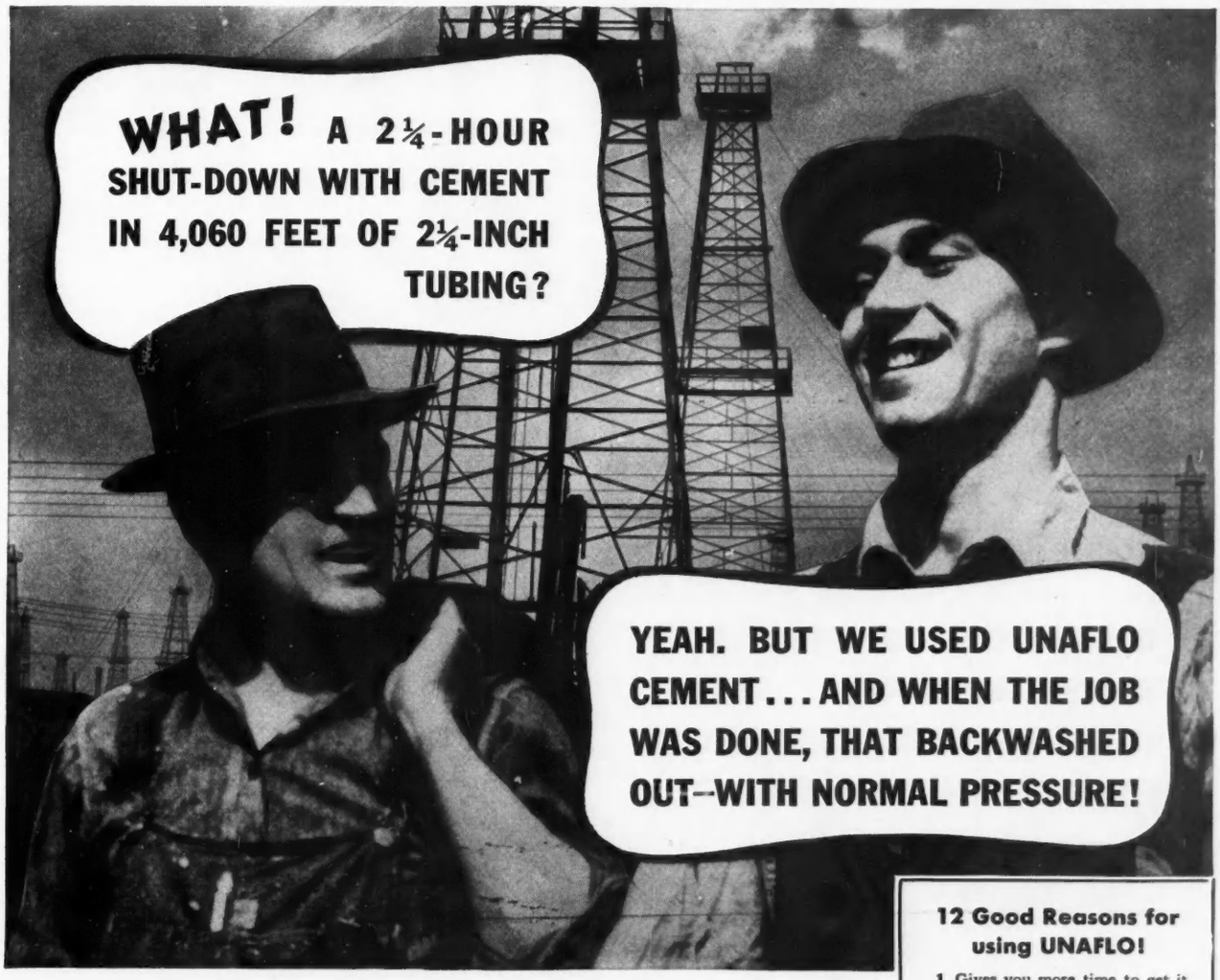
$$= 4.75 \text{ months}$$

Table I gives some comparisons of half saturation times for methane in Santa Fe Springs crude held in 20 mesh sand of 45 percent porosity.

TABLE I
Approximate Half-Saturation Times

Depth of Liquid Filled Sand	Time Required
100 feet	3,300 years
10 feet	33 years
5 feet	8 years
1 foot	4 months
6 inches	1 month
1 inch	20 hours
0.1 inch	12 minutes

This would indicate little benefit to be derived from the effects of gas in solution on the physical prop-


WHAT! A 2¼-HOUR SHUT-DOWN WITH CEMENT IN 4,060 FEET OF 2¼-INCH TUBING?
YEAH. BUT WE USED UNAFLO CEMENT... AND WHEN THE JOB WAS DONE, THAT BACKWASHED OUT—WITH NORMAL PRESSURE!

THEY ran a cement retainer to 4063 ft. on 2¼-in. tubing, above the top perforation—which previously had been cemented off. They then pumped 598 sacks of Unaflo Oil Well Cement into the tubing. Working pressure was only 1,000 to 1,500 lb. Elapsed time, so far—1 hour and 23 minutes.

Then mechanical trouble forced a shut-down. *Repairs took 2 hours and 14 minutes.*

Was this risky? Was their well investment in danger? NO! Far from it! They used *Unaflo* Cement! And Unaflo stayed fluid, and backwashed out with normal pressure in 32 minutes . . . . 4 hours and 22 minutes after the mixing started!

When things go haywire on a job—that's the time you're glad you used Unaflo, the cement with the retarded set that stays pumpable for over 4 hours at 180°. So play safe. Use Unaflo *every time!*

Write for "Oil Well Cementing Guide," which tells about Unaflo and its particular adaptability to Mid-Continent conditions. If you are in the Mid-Continent Field, send away *today*. Be sure to put your request on your business letterhead. Universal Atlas Cement Co. (United States Steel Corp. Subsidiary), Amicable Building, Waco, Texas; Kansas City; Tulsa; Oklahoma City.

12 Good Reasons for using UNAFLO!

1. Gives you more time to get it down.
2. Mixes and places easily with 35% water, thus eliminating need for excess water—a big menace to good cementing.
3. Follows irregularities of well bore and casing.
4. Easier to regulate viscosity at tub.
5. Hardens thoroughly with high density after placing.
6. Not stiffened by mud contamination.
7. Not affected by salt water contamination.
8. Sets satisfactorily in sulphate water.
9. Meets the requirements for sulphate resistance.
10. Makes squeeze and plug-back jobs easier, surer, more successful.
11. Permits operator to control cement rather than being controlled by it.
12. Has been proved by oil industry by consistently "coming through in the clinches" ever since its introduction.

OW-U-8

ATLAS Portland Cement

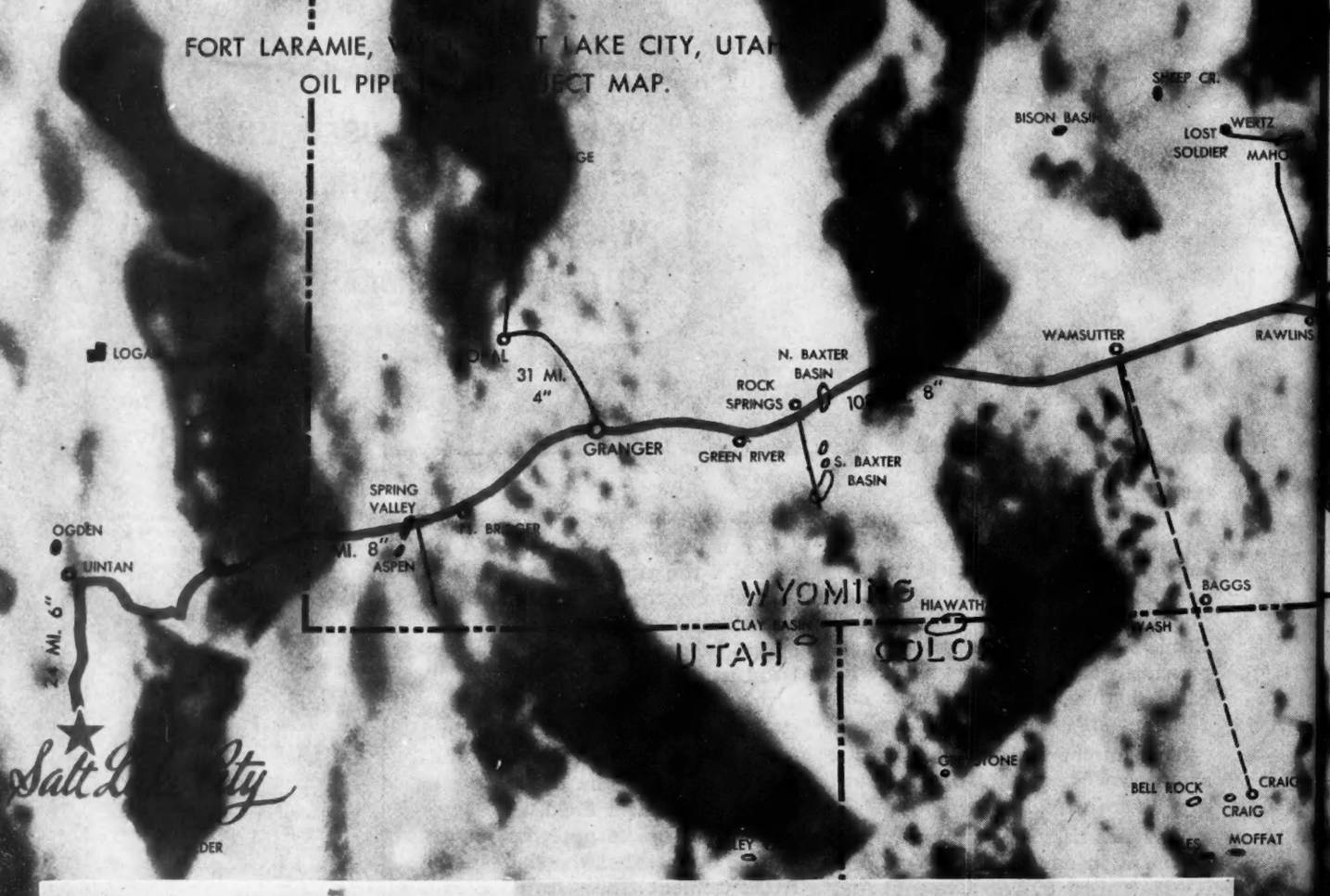
Universal Atlas CEMENTS

UNAFLO Oil Well Cement

"WALLS WITH

Cross the

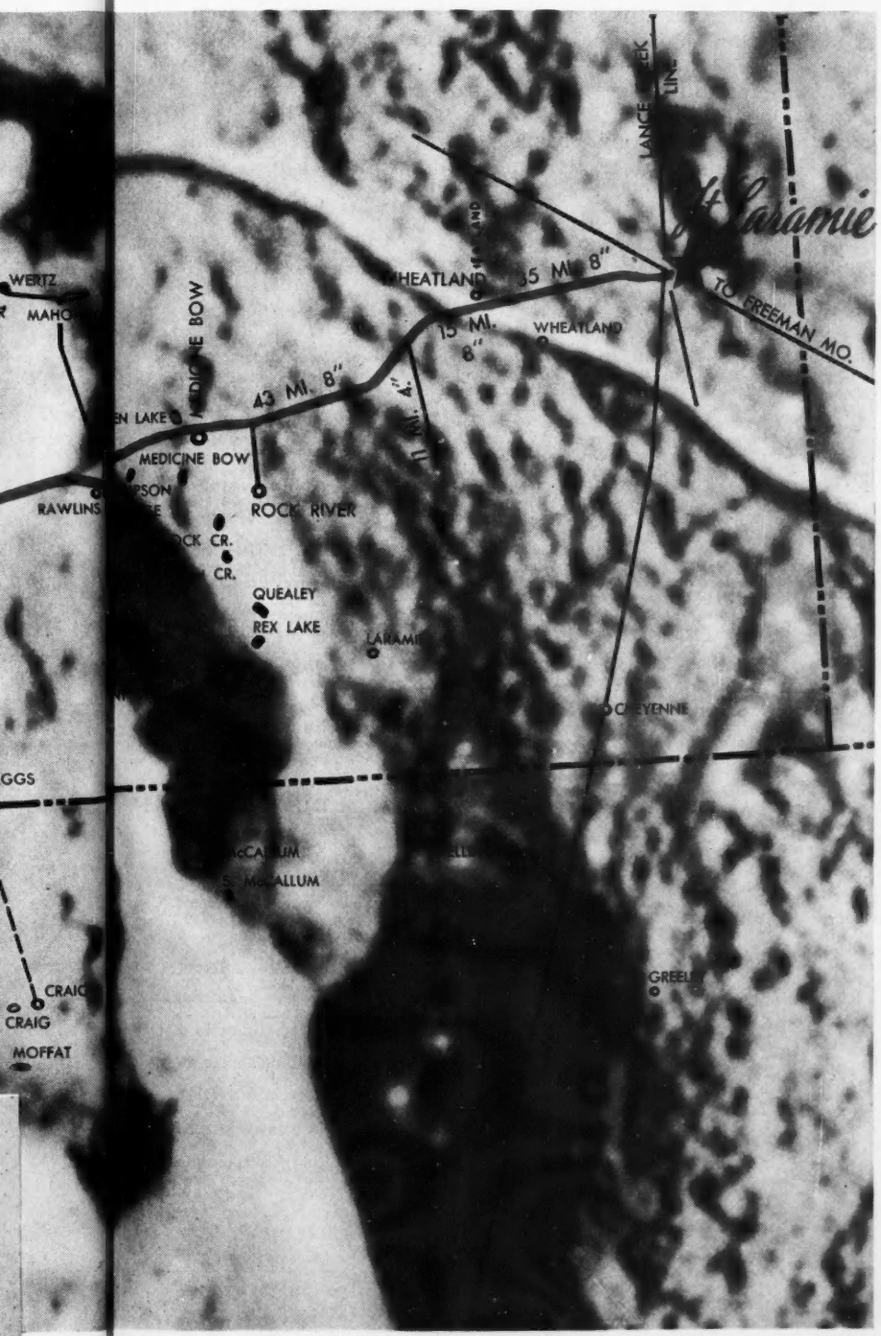
FORT LARAMIE, W... T LAKE CITY, UTAH
OIL PIPE... ECT MAP.



MAP SHOWS ROUTE new line of NATIONAL Seamless is taking. Elevations range from 4230 feet at its eastern terminus at Fort Laramie, Wyoming, to 7178 feet at the point just east of Wamsutter where it will cross the Continental Divide. As shown on the relief map above, this line traverses many varied types of terrain — across mountain ranges and over flat plateaus, barren land and fertile plain, over several rivers and innumerable small streams.

At left—**SOLID TRAIN LOADS OF NATIONAL SEAMLESS READY TO GO TO WORK.** Here is shown part of the many shipments of "Walls Without Welds" used on this vast project.

TOUT WELDS"
the Continental Divide



Record-Breaking Pipe Line ...Longest Since 1930... 438 Miles of NATIONAL SEAMLESS

UP over the Rockies, across the Continental Divide, goes this record-breaking pipe line to add new laurels to the already long list of achievements of NATIONAL Seamless.

Destined to carry crude oil to the Salt Lake City Refinery of the Utah Refining Company, this line will be approximately 438 miles long, of which 414 miles will be eight-inch pipe and 24 miles six-inch pipe . . . NATIONAL Seamless Line Pipe every foot of the way. This is the longest pipe line laid in the last nine years. Significant, too, is the fact that this is the first major oil line to be constructed in the Rocky Mountains across the Continental Divide. It will provide an outlet for new fields which may be developed along its route as production from existing fields declines. The line is expected to be completed and in operation by the end of the year.

NATIONAL Seamless was specified for this important line because it is an accepted fact that "Walls Without Welds" provide the extra margin of strength to withstand unpredictable stresses, ground settlements and unexpected pressures. NATIONAL Seamless will move oil economically through this mountainous territory for many years. For it is pierced from solid billets of finest quality steel. It provides full wall strength throughout, uniformly straight lengths, carefully finished ends, ample ductility for easy bending, and clean, smooth surfaces. It is readily handled and joined with minimum time and labor. Its use is your assurance of utmost dependability on every job.

NATIONAL TUBE COMPANY

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UNITED STATES STEEL

erties of the oil. The outlook is not as black as it would seem at first glance, however, for there are several factors to be considered. First, as gas is injected, the oil must move to make a place for it and as it moves currents are set up which will increase the rate of solution of the gas in the oil. Second, there will be some by-passing of the oil by the gas. While by-passing is not to be desired from the standpoint of production, a uniform drive being very much more desirable, it does provide more intimate contact of gas with the oil, increasing the rate of solution. Third, in the case of pressure maintenance, the desire and intention is to keep the rate of pressure decline in the formation as low as possible, thus keeping more of the original gas in solution in the oil and there is less need to worry then about rates of solution.

Another factor to be considered is the difference in rates of solution of various gases in an oil. Lacey[27] gives the relative solution rates of methane (taken as unity for comparison), ethane, and propane as 1:5½:18. In other words, the richer the gas the higher the rate of solution, the rate for a "wet" gas being higher than that for a dry gas. It is then a matter of economics in each case to decide whether to extract the gasoline from a gas before using for repressuring or pressure maintenance or to inject the wet gas from the separators. Both methods are being used.

Acknowledgments

The writer wishes to thank Dr. A. W. Gauger, director, Mineral Industries Experiment Station, The Pennsylvania State College, for his helpful criticism of and kind permission to publish this paper. Thanks are also due to Doctors S. T. Yuster and F. C. Todd of the Department of Petroleum and Natural Gas Engineering, The Pennsylvania State College, for their kind suggestions and to Dr. D. L. Katz of the Department of Chemical and Metallurgical Engineering, University of Michigan, for his suggestions on the construction of the phase diagram in Figure 1.

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Probable Discovery Rates in The Gulf Coast Area

By V. G. GABRIEL, Consulting Geophysicist

THE application of the theory of probabilities to everyday industrial life is a common phenomenon. Recently one of the prominent men in the United States insurance business was credited with saying, "We do not know who will die, but we know how many will die this year," thus expressing his belief in the high value of intelligent guessing.

The principles of the theory of probabilities were widely used during the last two decades in oil economics and to some extent in the evaluation of the American oil drilling and production activities. Recently a new trend toward a broader application of the same principles to the study of numerous factors present in exploration and drilling for oil has been noticed. However, Weatherby, in his article pertaining to geophysical exploration, stated in 1936, "I believe the value of properly compiled pertinent statistics has not been fully appreciated." DeGolyer somewhat later wrote, "Company accounts are not set up generally in a form which makes the determination of costs a problem of easy solution and this is particularly true of the finding costs . . . As to a critical analysis of statistics, we do not even have general statistics for the industry as a whole on the results and hazards of prospecting."

Geophysical Tables

Geophysical tables contain the results achieved by seismic and torsion balance exploration in the Gulf Coast area prior to the middle of 1938. The first six columns of these tables contain information pertaining to the location of an oil field, the date of its finding, the date and means of its oil discovery, the amount of oil produced, and the ultimate oil recovery. The last column gives the amount of oil in thousands of barrels which should be credited to either seismic or torsion balance methods.

Probability Table

	1935	1936	1937
Ratio of new oil fields to number of "wildcats" drilled:			
In Texas Gulf Coast	1:17		
In Louisiana Gulf Coast	1:7		
Average for Louisiana-Texas Gulf Coast	1:12		
Average for major companies, Texas Gulf Coast	1:3.9		
Average for major companies, Louisiana Gulf Coast	1:3.6		
Ratio of number of oil and gas wells to total number drilled:			
In South Louisiana, Houston and Beaumont districts	1:9	1:7	
In South Louisiana	1:8	1:10	1:5
In Houston district	1:12	1:5	
In Beaumont district	1:9	1:7	
In Louisiana:			
Based on geological information			1:17
Based on geophysical information			1:3
Based on geological and geophysical information			1:2
In Texas:			
Based on geological information			1:9
Based on geophysical information			1:4
Based on geological and geophysical information			1:8(?)
Average number of wells required to establish production per salt dome prior to 1936:			
On geophysically discovered salt domes	3:1		
On non-geophysically discovered salt domes	12.1		

REMARKS: Based on data by Dunbar, Gabriel, Ickes, Lahee, Rosaire, Stiles and others.

Seismograph Table Pertaining to Oil Fields Discovered in Gulf Coast Area by Seismic Methods to Middle of Year of 1938

TEXAS GULF COAST

OIL FIELD	Found	Oil Discovered	Means of Discovery	Production to July, 1938 (Thousands of Barrels)	Ultimate Recovery (Thousands of Barrels)	Amount Credited to Seismograph (Thousands of Barrels)
Austin County						
New Ulm-Industry	1934	1934	Geop. & Geol.	.....	.....	.....
Brazoria County						
Bryan Mound	1935	1935	Rfl. Seism.	.....	No Est.	.....
Danbury	1929	1930	Seism. & Geol.	43	500	250
Manvel	1929	1931	Geol., T. Bal. & Seism	12,488	50,000	10,000
Old Ocean	1934	1934	Rfl. Seism.	1,357	100,000	100,000
Pledger	1932	1932	Rfl. Seism. & T. Bal.	17	Gas	.....
Sandy Point	1933–36	1937	Rfl. Seism. & T. Bal.	105	6,000	3,000
Chambers County						
Anahuac	1932–34	1935	Rfl. Seism. & T. Bal.	8,710	300,000	150,000
Cedar Bayou	1937	1937	Rfl. Seism. & Geol.	1	50	25
Cotton Lake	1936	1936	Rfl. Seism. & T. Bal.	619	6,000	3,000
Lost Lake	1925–27	1929	Seism. & Gas Seeps.	914	1,500	750
Seabreeze-Willow Slough	1934	1936	Rfl. Seism. & T. Bal.	143	20,000	10,000
South Cotton Lake	1935	1936	Rfl. Seism. & T. Bal.	Included in Cotton Lake Est.		
Turtle Bay	1933–35	1935	Rfl. Seism. & T. Bal	690	10,000	5,000
Fort Bend County						
Orchard	1924	1926	Rfr. Seism	3,380	5,000	5,000
Galveston County						
Dickinson	1928	1934	Rfl. Seism. & T. Bal.	4,058	40,000	20,000
Green's Lake	1928, 35	1936	Rfl. Seism. & T. Bal.	35	150	75
Hitchcock	1929, 35-36	1937	Rfl. Seism., T. Bal. & Geol	53	500	170
Hardin County						
Ariola	1928	1932	Seism	1,780	4,000	4,000
Harris County						
Clear Lake	1934–35	1938	Rfl. Seism.	.....	1,000	1,000
Clinton	1933–34	1934	T. Bal. & Seism., later	46	2,000	1,000
Fairbanks	1928, 33, 37	1938	Rfl. Seism. & T. Bal.	112	23,000	11,500

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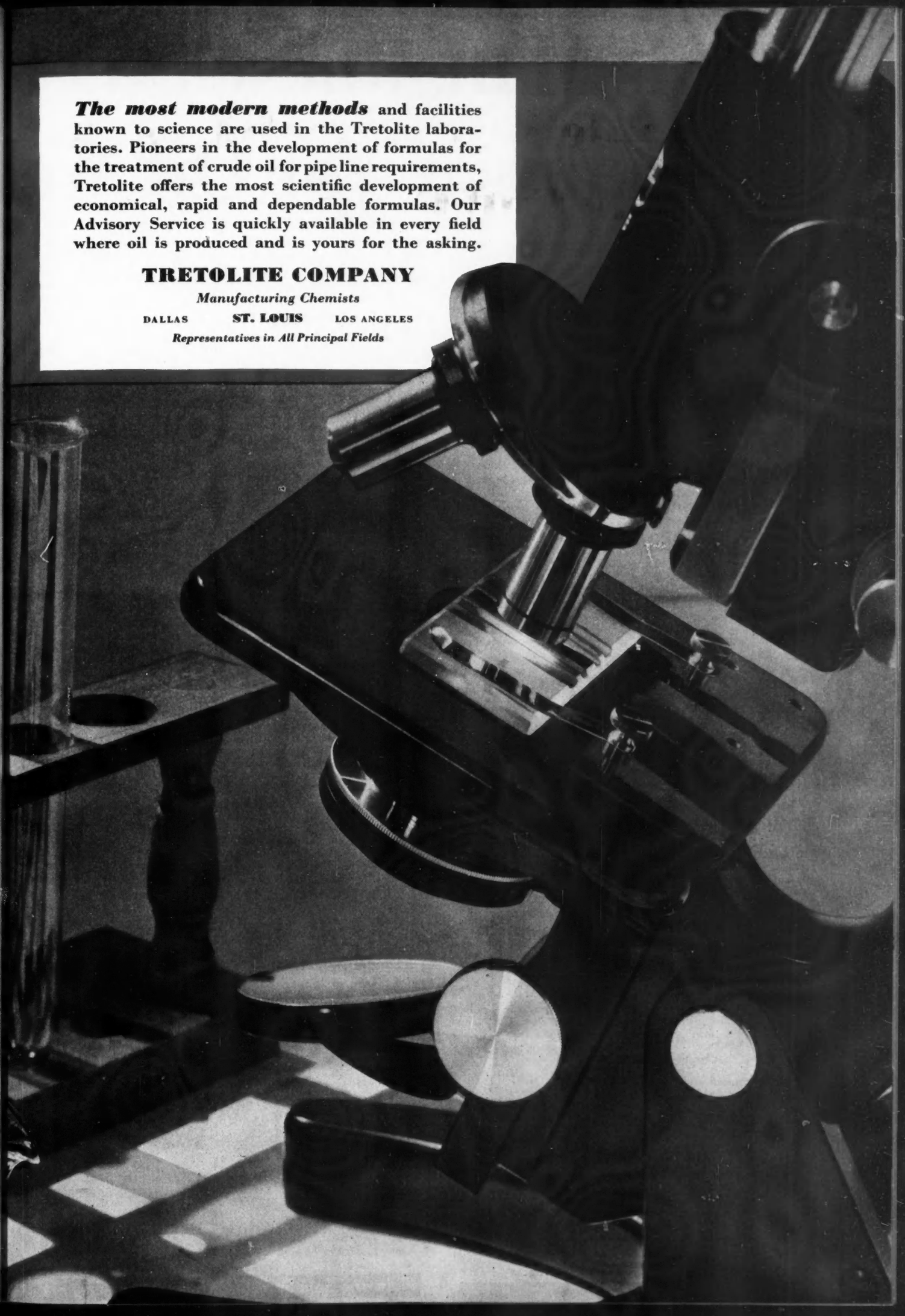

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What is Manganese Steel?

Steel Known" *for* Oil We

1. *What is manganese steel?*
   Standard manganese steel is an alloy of manganese, carbon and iron, containing 10.0 to 16.0% (usually 13.0%) manganese, which is austenitic after heating and quenching. So-called "manganese steels" containing 1.5 to 2.0% manganese do not have the same properties.

2. *Briefly, what is the history of manganese steel?*
   (a) Discovered by Hadfield in England in 1882.
   (b) Introduced in America in 1892.
   (c) First made by Amsco in 1906.
   (d) First produced in the electric furnace in 1919.
   (e) Still "The Toughest Steel Known" in 1939.

3. *What are the chemical constituents of standard manganese steel?*
   Principally iron, manganese and carbon. See pg. 10, Cat. 59.

4. *What are the physical properties of cast heat-treated standard manganese steel?*
   High tensile strength and ductility, unequalled toughness and work-hardening property. See pg. 10, Cat. 59.

5. *Is manganese steel hard?*
   Its initial hardness (185-200 Brinell), is little greater than that of ordinary cast steel, but under repeated impact the surface hardness increases immensely, reaching at the point of embrittlement a maximum of 550 Brinell. The surface hardness so obtained is continuously renewed so long as the service continues, while the body metal retains is original toughness.

6. *Is manganese steel brittle?*
   As cast, before heat treatment, it is as brittle as cast iron, but after heating and quenching it has a greater toughness than any other steel.

7. *Why is manganese steel tougher than any other steel?*
   The extremely cohesive structure known metallurgically as austenite, acquired from the heating and quenching process, is in manganese steel very strong and ductile, which two properties combined constitute toughness.

8. *Why is manganese steel so remarkably wear resistant under impact and abrasion?*
   The metal structure becomes increasingly hard and "set" in the areas stressed, in proportion to the repetition and severity of attack. Without such cold-working it is about as abrasion resistant as tool steel or chilled cast iron.

9. *Why will manganese steel resist shock stresses?*
   Because its high tensile strength and unusual ductility in combination, meaning toughness, enable it adequately to resist shock stresses and yet to yield or deform under heavy impacts rather than to break.

10. *Can manganese steel be bent or deformed?*
    Heat treated, cast manganese steel in bar form can be bent double when cold without fracture. Likewise, castings in service will deform before fracturing. Such deformation, however, is not continuous because cold-working raises the yield strength in stressed areas.

11. *Can manganese steel be forged?*
    It is possible to forge standard manganese steel, but experience is necessary to avoid degrading the metal. After forging, it is essential to re-heat-treat, as was done with the original casting.

12. *How can manganese steel be re-heat-treated?*
    After forging or massive welding, standard manganese steel should be heated uniformly throughout to 1850° F. and quenched in water. This temperature is indicated by a light orange color.

13. *Can manganese steel be used in places that are hot?*
    Only for a limited time and when the temperature does not exceed 650° F. With 3.0 to 5.0% nickel and less than normal carbon content, cast manganese steel can be used safely in temperatures up to 1100° F.

14. *Can manganese steel be welded?*
    For building up to compensate for wear, manganese steel can be welded with nickel-manganese steel welding rod; and for repairing fractures either that rod or stainless steel rod is successfully used. Less care is necessary to avoid degradation by extensive overheating, on nickel-manganese steel parent metal than on standard manganese steel.

15. *Can manganese steel be hard-surfaced?*
    In certain applications where the service is highly abrasive with little or no impact, manganese steel castings have their wearing life sufficiently enhanced to justify the additional cost. There is no unusual difficulty in applying Amsco No. 459 or Economy hard-facing rods by torch or arc.

16. *Is it necessary to lubricate contacting surfaces of manganese steel?*
    Where it is difficult to lubricate bearing areas or where dust or grit enter the oil or grease to form an abrasive mixture, manganese steel moving parts need not and often should not be lubricated. The work-hardening and surface polishing that take place compensate adequately for lack of lubrication between closely contacting members.

17. *Can manganese steel be machined?*
    Standard manganese steel can be cut with special tool steel or cemented carbide tools, but special technique and equipment are required. Attempting to tool by ordinary methods merely results in work-hardening of the steel at the point of contact and wearing out of the tool with little result.

18. *How is manganese steel usually machined?*
    Tooling, by whatever method, is expensive and is only used when grinding wheels cannot be employed. Practically all machining on manganese steel is done by grinding.

19. *Can patterns for iron or ordinary steel castings be used for manganese steel?*
    Only where considerable tolerances in dimensions are permissible. Manganese steel shrinks $\frac{5}{16}$" to a foot from liquid to solid, where ordinary ferrous metals shrink $\frac{3}{16}$" or $\frac{1}{4}$". For several reasons patterns should usually be especially constructed for manganese steel castings.

20. *How can manganese steel be distinguished from other iron or steel?*
    It is almost completely non-magnetic.

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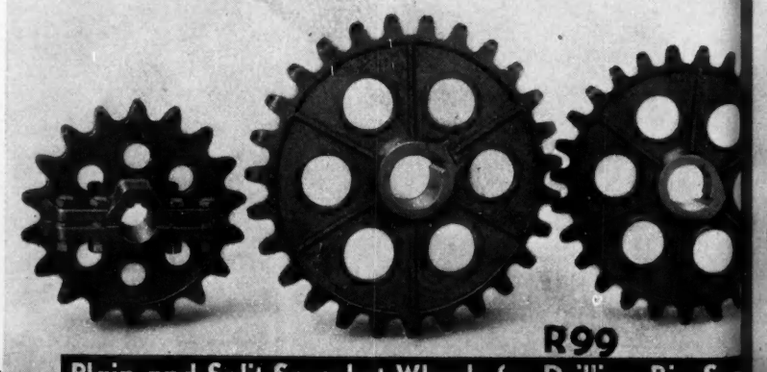

R99

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21. Why is manganese steel non-magnetic?

All steels become non-magnetic above a critical temperature range. Standard manganese steel retains the same non-magnetic property when cold that it had at the quenching temperature of 1850° F.

22. What special value has manganese steel?

Wherever metal is required to combat abrasion associated with heavy repeated impact, standard manganese steel resists breakage much better than ordinary steel and usually has from twice to ten times the wearing life.

The heavier loads and greater wear imposed by deeper drilling and higher speed operations increase the need for manganese steel parts for machines and equipment in modern day oil well drilling. Here, too, economy of operation and freedom from breakdown troubles demand the superior impact and abrasion resistance provided by manganese steel. Typical cast manganese steel parts are shown.

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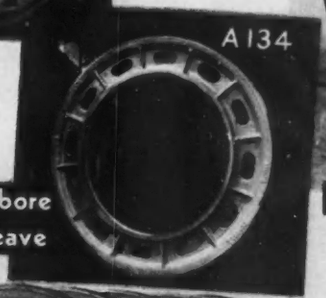

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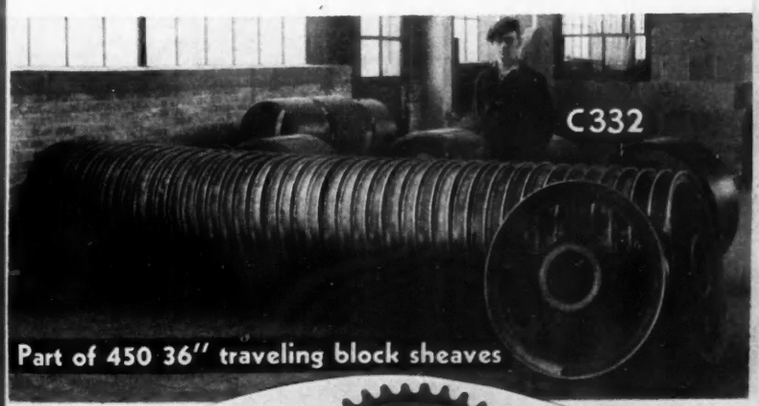
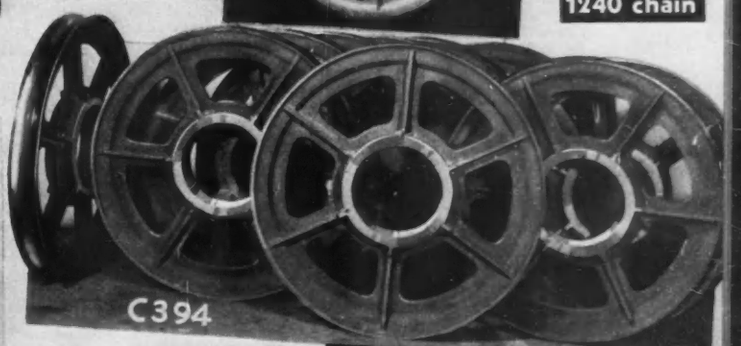
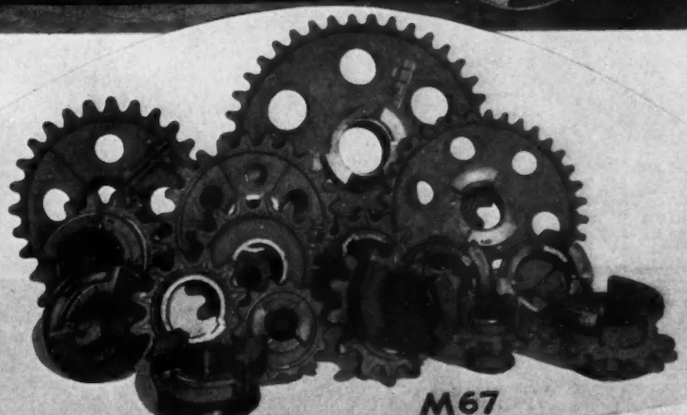
Split sprocket wheel for 1240 chain



Part of 450 36" traveling block sheaves



42" traveling block sheaves



Complete draw works sprocket wheels and clutches

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Seismograph Table Pertaining to Oil Fields Discovered in Gulf Coast Area by Seismic Methods to Middle of Year of 1938

Continued

TEXAS GULF COAST—Continued

OIL FIELD	Found	Oil Discovered	Means of Discovery	Production to July, 1938 (Thousands of Barrels)	Ultimate Recovery (Thousands of Barrels)	Amount Credited to Seismograph (Thousands of Barrels)
Harris County—Cont'd.						
Eureka	1933–34	1934	T. Bal., Seism., later	85	9,500	3,000
Friendswood	1933	1937	Rfl. Seism., T. Bal., Geol., Grav.	420	250,000	62,500
South Houston	1934	1935	Rfl. Seism. & T. Bal.	3,851	10,000	5,000
Houston County						
Kitrell	1932	1934	Geol. & Geoph.	.....	2,500	1,000
Jefferson County						
Amelia	1934–35	1936	Rfl. Seism. & T. Bal.	2,069	20,000	10,000
Cheek	1929, 33, 38	1938	Rfl. Seism. & T. Bal.	20	3,000	1,500
Clam Lake	1928	1937	Rfl. Seism.	16	2,500	2,500
Fannett	1925	1927	Rfr. Seism.	2,312	3,500	3,500
Jefferson Coast	1932–37	1938	Rfl. & Rfr. Seism., Geol., T. Bal.	.....	.....	.....
Nederland	1937	1937	Rfl. Seism.	.....	.....	.....
North Cheek	1935–36	1937	Rfl. Seism., T. Bal.	54	5,000	2,500
West Beaumont	1935–36	1936	Geoph.	604	4,000	2,000
Liberty County						
Cleveland	1931	1933	Geol. & Rfr. Seism., Pnd., T. Bal.	996	2,504	500
Hardin	1935	1935	Geol., Check by Rfl. Seism.	1,052	8,500	1,000
Moss Bluff	1926	1929	Rfr. Seism.	180	?	?
Matagorda County						
Hawkinsville	1928, 35	....	Rfl. Seism., Geoph.	.....	?	?
McCroskey-Armour	1937	1938	Rfl. Seism.	10	1,000	1,000
Palacios	1934	1937	Rfl. Seism.	70	1,000	1,000
Simsonville-Robbins Ranch	1936	1938	Rfl. Seism.	.....	?	?
South Bay City	1934, 35	1936	Rfl. Seism.	372	3,000	3,000
Van Vleck	1932	1934	Geol., Rfl. Seis.	1,557	20,000	10,000
Wilson Creek	?	1937	Rfl. Seism.	.....	?	?
Montgomery County						
Conroe	1931	1931	Geol. & Rfr. Seism.	92,718	670,000	335,000
Magnolia	1936, 37	1938	Rfl. Seism., T. Bal., Geol.	.....	.....	.....
Splendora	1933	1934	Rfl. Seism.	1	250	250
Newton County						
Call	1933-36	1937	Rfl. Seism. & T. Bal.	10	1,500	750
Sabin Tram Block (2)	1936	1937	Rfl. Seism. & T. Bal.	.....	.....	?
Orange County						
Port Neches	1928	1929	Rfr. Seism.	4,693	12,000	12,000
Polk County						
Segno	1933	1936	Rfr. Seism. & T. Bal.	789	10,000	5,000
Gold Spring-Evergreen	1933	1936	Geol. & Geoph.	.....	.....	.....
Tyler County						
Spurger	?	1937	Rfl. Seism. & T. Bal.	191	5,000	2,500
Waller County						
Katy	1934	1935	Rfl. Seism.	.....	Gas	Gas
San Felipe	1927	1934	Seism.	21	100	100
Wharton County						
Five Corners	1934–35	1936	Rfl. Seism. T. Bal.	Included with Withers		
Blue Basin	1932	1937	Rfl. Seism. T. Bal.	Gas	Gas	Gas
Louise	1928	1933	Rfr. Seism.	1,990	5,500	5,500
Pickett Ridge-Kubela	1934	1935	Rfl. Seism. & T. Bal.	1,689	10,000	5,000
Spanish Camp	1934	1936	Rfl. Seism. & Geoph.	Gas	Gas	Gas
Withers	1934	1936	Rfl. Seism. & T. Bal.	1,166	20,000	10,000
Total for Texas Gulf Coast Area						811,000

LOUISIANA GULF COAST

Acadia Parish						
Bayou Mallet	1934–35	1936	Rfl. Seism. & T. Bal.	141	1,000	750
Bosco	1929	1934	Rfr. Seism.	16,110	30,000	30,000
North Crowley	1935	1937	Rfl. Seism., Geol., Grav.	168	6,000	3,000
South Crowley	1934	1938	Rfl. Seism. & T. Bal.	2	1,000	500
Tepetate	1934	1935	Rfl. Seism. & T. Bal.	4,738	20,000	10,000
Allen Parish						
Oberlin	1937	1938	Geoph.	.....	.....	.....
Ascension Parish						
Sorrento	1926	1928	Geol. & Rfr. Seism.	860	2,000	1,000
Assumption Parish						
Napoleonville	1926	?	Geol. & Seism.	.....	?	?
Beauregard Parish						
Bancroft	1934, 37	1938	Pnd., Geoph.	.....	?	?
Calcasieu Parish						
English Bayou	1933	1935	Rfl. Seism. & T. Bal.	Included with Gillis		
Gillis	1928, 31	1933	Geol., Selsm., T. Bal.	14,673	22,000	11,000
Iowa	1929	1931	Seism., T. Bal., Geol.	32,096	45,000	15,000
Starks	1925	1927	Rfr. Seism.	2,477	4,000	4,000
Cameron Parish						
Big Lake	1934	1935	Rfl. Seism.	66	1,000	1,000
Black Bayou	1927	1929	Geol., Seism.	5,367	10,000	5,000
Calcasieu Lake	1927	....	Seism.	.....	.....	.....
Cameron Meadows	1929	1931	Geol., Seism., T. Bal.	5,650	15,000	5,000
Creole	1933–34	1938	Rfl. Seism.	23	2,000	2,000
East Hackberry	1926	1927	Rfr. Seism. & Geol.	20,155	35,000	17,500
Gulf of Mexico Block (2)	1936	....	Rfl. Seism.	.....	.....	.....
East Baton Rouge Parish						
University-S.B. Rouge	1935	1938	Rfl. Seism.	34	1,000	1,000
Evangeline Parish						
Villa Platte	1936	1937	Rfl. Seism., Geol., T. Bal.	303	15,000	5,000
Iberia Parish						
Fausse Point	1926	1927	Rfr. Seism.	62	No Est.	?
Jefferson Island	1895-1937	1938	Rfl. Seism., Geol.	3	500	250
Vermilion Bay	1927	1938	Seism.	.....	.....	.....
Iberville Parish						
Bayou Blue	1926	1929	Seism.	75	100	100
Bayou De Glaise	1926	?	Seism.	.....	.....	.....
Choctaw	1926	1931	Rfr. Seism.	1,955	5,000	5,000
White Castle	1926	1929	Rfr. Seism.	2,536	6,000	6,000
Jefferson Parish						
Lafitte	1934	1935	Rfl. Seism., Geoph.	9,830	100,000	50,000

However, the proper estimation of the amount of oil which should be credited to any geophysical or geological exploration method participating in an oil discovery is a complex problem. In the first place, we do not have standardized or well accepted assumptions in dealing with detailed analysis of oil reserves discovered by the application of different methods. Moreover, in some cases the scarcity of detailed information pertaining to various phases leading to actual oil discoveries, make the proper evaluation extremely difficult. In the analysis of material contained in the geophysical tables, certain assumptions were made based on field and interpretation factors present in exploration for oil. In case, when two or more different methods were responsible for an oil discovery, the ultimate oil recovery, expressed in thousands of barrels, is split into equal parts, and to each method is given equal share. When "geophysics" was given credit for an oil discovery, the geophysical methods which could be successfully applied in the area under discussion are given credit for the oil discovery in equal amounts.

Probability Table

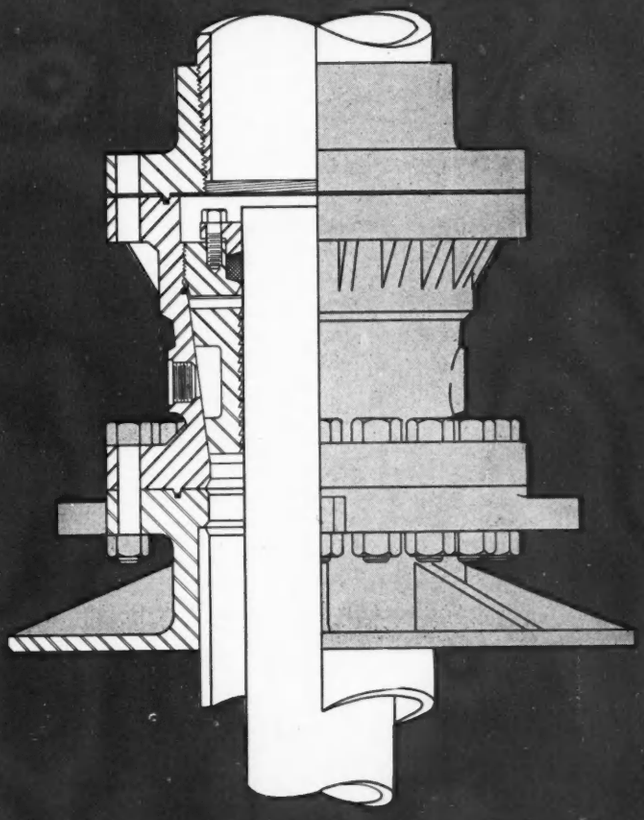
The probability table gives some data pertaining to the chance of discovering the oil and gas fields and wells under various conditions, chiefly in the Gulf Coast area. It is of interest to note the marked improvement from year to year in the chance of discovering oil and the high value of combined geophysical and geological information in "wildcat" drilling.

Recapitulation and Conclusions

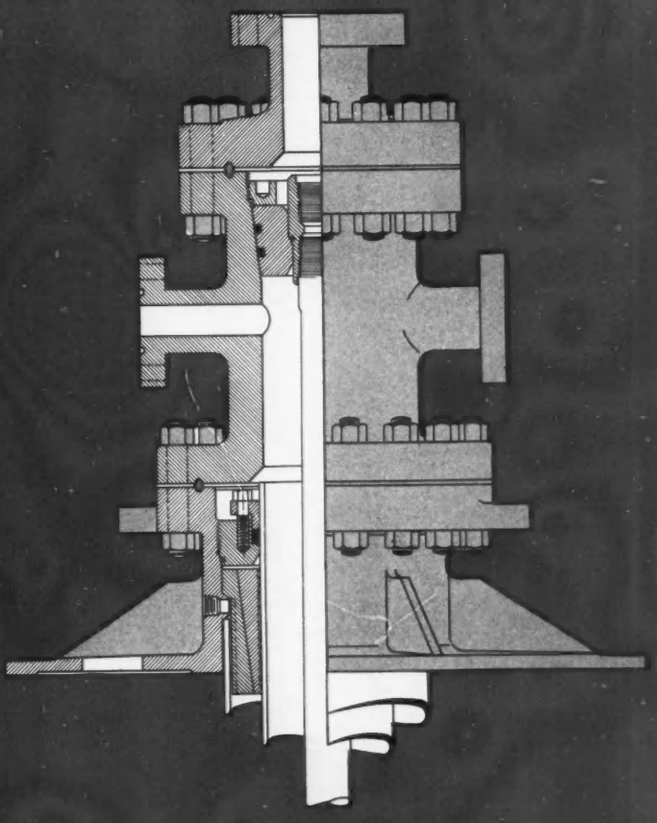
Under proper assumptions, cer-

For conserving cellar space

REGAN COMBINATION LANDING BASE AND ALL-FLANGED TUBING HEAD



Conventional Regan Casing Head Hook-up, Type BG-4, with Landing Base and Companion Flange to Riser Nipple and Tubing Head.



Regan Combination Landing Base with G C-8 Double Plug Flanged Tubing Head.

The Regan Combination Landing Base and Slip Type Head (shown at the right) sets a new precedent in the conservation of cellar space by eliminating one head from the conventional hook-up (as shown on the left). Approximately 18 inches less cellar space is needed and when only two strings of casing are set, the G C-8 All-Flanged Tubing Head provides a compact unit which allows the entire Xmas tree to be installed below the derrick floor. This economy of cellar space is matched by the economy in the cost of the hook-up.

The Regan G C-8 Double Plug Tubing Head permits the moving of tubing under pressure and provides a full opening type head when the bushing is removed. This allows free passage of tubing catchers or bottom hole packers. As shown at the right it is furnished with flanged side outlets and adapter spool for completely flanged Xmas trees. It may also be obtained in the more conventional form with threaded outlets and master gate connections.

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Seismograph Table Pertaining to Oil Fields Discovered in Gulf Coast Area by Seismic Methods to Middle of Year of 1938

Continued

LOUISIANA GULF COAST—Continued

OIL FIELD	Found	Oil Discovered	Means of Discovery	Production to July, 1938 (Thousands of Barrels)	Ultimate Recovery (Thousands of Barrels)	Amount Credited to Seismograph (Thousands of Barrels)
Jefferson Davis Parish						
Roanoke	1928	1934	Seism., T. Bal., Geol	6,726	13,000	4,300
South Elton	1935	1937	Rfl. Seism., Geoph	11	1,000	500
South Jennings	1934-35	1936	Rfl. Seism., T. Bal	6	1,000	500
South Roanoke	1935	1937	Rfl. Seism	24	1,000	1,000
Woodlawn	1927, 37	1938	Rfl. Seism., T. Bal., Geoph	20	1,000	400
La Fourche Parish						
Chacahoula	1926	?	Rfl. Seism., Geol		Salt Dome	
Lake Long	1935	1937	Rfl. Seism	195	8,000	8,00
Leesville	1928	1931	Seism.	18,604	25,000	25,000
Marchand	1928	1937	Rfr. Seism		Salt Dome	
Raceland	1936	1938	Rfl. & Rfr. Seism., Geol	94	5,000	3,400
Timbalier Bay	1936	1938	Rfl. Seism. & Grav	34	1,000	500
Valentine	1932	1936	Rfl. Seism	1,872	15,000	15,000
Plaquemine Parish						
Bird Island	1937	1938	Rfl. Seism	.....	?	?
Garden Island Bay	1928	1935	Rfr. Seism	1,468	3,000	3,000
Lake Hermitage	1928	1934	Rfr. Seism	115	1,000	1,000
Lake Washington	1928	1931	Rfr. Seism	2,276	5,000	5,000
Potash	1929, 37	1937	Rfr. Seism., Geol	1	200	100
Quarantine Bay	1936	1937	Rfl. Seism., Grav	107	12,000	6,000
Venice	1928	1937	Rfr. Seism	358	7,000	7,000
St. Charles Parish						
Bayou des Allemands	1935	1937	Rfr. & Rfl. Seism	62	2,000	2,000
St. Landry Parish						
Cankton	1935	1936	Rfl. Seism., Geol	?	?	?
Port Barre	1926	1929	Rfr. Seism	7,083	9,500	9,500
St. Martin Parish						
Henderson	1934	1937	Rfl. Seism		Salt Dome	
Lake Mongoulou	1927, 34	1936	Geoph. & T. Bal		Salt Dome	
St. Martinville	1935	1935	Rfl. Seism, T. Bal., Geol	68	2,000	700
St. Mary Parish						
Bateman Lake	1929, 35	1937	Rfl. Seism	74	2,000	2,000
harenton	1934	1936	Rfl. Seism., T. Bal., Geol	664	10,000	3,400
Horseshoe Bayou	1929, 35	1937	Rfl. Seism	159	8,000	8,000
Jeanerette	1935	1935	Rfl. Seism., Geol	4,565	12,500	6,250
Terrebonne Parish						
Bay St. Elaine	1927	1929	Seism	73	1,000	1,000
Caillou Island	1928	1930	Rfr. Seism	19,334	45,000	45,000
Dog Lake	1927	1929	Rfr. Seism	1,342	5,000	5,000
East Bay Junop	1927		Rfr. Seism		Salt Dome	
Four Isle	1927	1934	Rfr. Seism	293	3,000	3,000
Gibson	1936	1937	Rfl. Seism	898	18,000	18,000
Lake Barre	1928	1929	Seism	16,621	20,000	20,000
Lake Pelto	1928	1929	Rfr. Seism	965	5,000	5,000
Lirette-Houma Gas F	1935	1937	Rfl. Seism., T. Bal., Geol	35	1,000	350
West Dulac	1936, 37	1937	Rfl. Seism	5	1,000	1,000
Vermilion Parish						
Abbeville	1929	1937	Rfl. Seism., Geoph	123	5,000	2,500
Gueydan	1929	1932	Rfr. Seism	810	1,500	1,500
Intercoastal City	1935, 37	1937	Rfl. Seism	.....	.....	.....
West Gueydan	1934	1938	Rfl. Seism	.....	No Est.	
Total, Louisiana Gulf Coast Area						343,000
Total, Texas Gulf Coast Area						811,000
GRAND TOTAL, LOUISIANA AND TEXAS GULF COAST						1,154,000

NOTE—Based on data by Charles Leyendecker, The OIL WEEKLY staff, and others.
Rfl.—Reflection. Rfr.—Refraction. Seism.—Seismic. T. Bal—Torsion Balance. Geol.—Geology. Grav.—Gravimeter. Pnd.—Pendulum. Geoph.—Geophysics.

Torsion Balance Table Pertaining to Oil Fields Discovered in Gulf Coast Area by Torsion Balance to Middle of Year of 1938

TEXAS GULF COAST

OIL FIELD	Found	Oil Discovered	Means of Discovery	Production to July, 1938 (Thousands of Barrels)	Ultimate Recovery (Thousands of Barrels)	Amount Credited to Tor. Balance (Thousands of Barrels)
Austin County						
New Ulm-Industry	1934	1934	Geol. & Geoph	.....	.....	.....
Brazoria County						
Allen	1925	1927	T. Bal	88	100	100
Austin Bayou	1930	1930	T. Bal	.....	.....	.....
Hastings	1934	1934	T. Bal	12,500	400,000	400,000
Lockridge	1929	1936	T. Bal	1	15,000	15,000
Manvel	1929	1931	T. Bal., Geol., Seism	12,488	50,000	20,000
Pledger	1932	1932	T. Bal. & Seism	Gas	Gas	Gas
Sandy Point	1933-36	1937	T. Bal. & Rfl. S	105	6,000	3,000
Chambers County						
Anahuac	1932-34	1935	T. Bal. & Rfl. S	8,710	300,000	150,000
Cedar Point	1934-36	1938	T. Bal	40	36,000	36,000
Cotton Lake	1936	1936	T. Bal. & Rfl. S	619	6,000	3,000
Seabreese-Willow Slough	1934	1936	T. Bal. & Rfl. S	143	20,000	10,000
South Cotton Lake	1935	1936	T. Bal. & Rfl. S	Included in Cotton Lake Field		
Turtle Bay	1933-35	1935	T. Bal. & Rfl. S	680	10,000	5,000
Colorado County						
Garwood	1932	1932	T. Bal., Geol., Magn	2	100	35
Fort Bend County						
Long Point	1924	1928	T. Bal	.....	.....	.....
Nash	1923	1926	T. Bal. & Geol	1,668	1,750	900
Sugar Land	1928	1928	T. Bal. & Geol	26,761	90,000	45,000
Thompsons	?	1931	Geol. & Some T. Bal	27,691	210,000	42,000

tain detailed evaluations of the role played by geophysical and geological methods in exploration for oil can be made in spite of close relationship and mutual dependence of geological and geophysical phases in exploration for oil. Assuming that the Gulf Coast area oil reserves, in barrels, were equal to 250,000,000 in 1925, 2,032,000,000 (Deussen) in 1935, 2,300,000,000 in 1936, and 2,798,000,000 (Deussen) in January, 1938, and accepting 2,294,000,000 as the total amount of oil, in barrels, discovered by geophysical exploration in the same territory from 1925 to the beginning of 1938, and 873,000,000 from 1935 to 1937, inclusive, we obtain 65 percent and 76 percent as the percentages of oil discovered by geophysics out of the total estimated amount discovered to the beginning of 1938 and in the time interval from 1935 to 1937, inclusive. By the same method of reasoning, geological exploration should take credit for 35 percent from 1925 to the beginning of 1938, for 24 percent from 1935 to 1937, inclusive, out of the total amount of oil discovered.

Assuming that the Gulf Coast area of Louisiana oil reserves, in barrels, were equal to 40,000,000 in 1925, 437,000,000 (Deussen) in January, 1938, and accepting 495,000,000 as the estimated amount of oil, in barrels, discovered by geophysics in the same territory, we obtain 71 percent as the percentage discovered by geophysical prospecting out of the total amount of oil found from 1925 to 1937, inclusive. To geological exploration, however, should be given credit for the discovery of 29 percent.

Accepting $52,000,000 as the total sum spent on geophysical pros-

pecting in the Gulf Coast area prior to 1938, excluding electrocoring, we obtain the average cost of geophysical discovery as equal to $.023 per barrel of oil.

Accepting $46,000,000 as the total sum spent on seismic and torsion balance prospecting in the Gulf Coast area prior to 1938, and $20,300,000 spent in 1935 to 1937, inclusive, we obtain $.021 and $.023 as the average cost for torsion balance and seismic discovery per barrel of oil from 1925 to 1937, inclusive, and from 1935 to 1937, inclusive, respectively.

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Torsion Balance Table Pertaining to Oil Fields Discovered in the Gulf Coast Area by Torsion Balance to Middle of Year 1938

Continued

TEXAS GULF COAST—Continued

OIL FIELD	Found	Oil Discovered	Means of Discovery	Production to July, 1938 (Thousands of Barrels)	Ultimate Recovery (Thousands of Barrels)	Amount Credited to Tor. Balance (Thousands of Barrels)
Galveston County						
Dickinson	1928	1934	T. Bal. & Rfl. S.	4,058	40,000	20,000
Green's Lake	1928-35	1936	T. Bal. & Rfl. S.	35	150	75
Hitchcock	1929-35-36	1937	T. Bal. & Seism., Geol	53	500	170
Hardin County						
Silsbee	1934-35	1936	T. Bal.	718	9,000	9,000
Harris County						
Bammel	1928	1937	T. Bal.	9	500	500
Clinton	1927, 33-34	1936	T. Bal. & Rfl. S.	46	2,000	1,000
Eureka	1933-34	1934	T. Bal. & Seism., later	85	9,500	6,500
Fairbanks	1928, 33, 37	1938	T. Bal. & Rfl. S.	112	23,000	11,500
Friendswood	1933	1937	T. Bal., Seism., Geol., Grav	420	250,000	62,500
Mykawa	1928	1929	T. Bal. & Geol.	3,267	5,000	2,500
Satsuma	1928, 34-35	1936	T. Bal.	215	4,000	4,000
South Houston	1934	1935	T. Bal. & Rfl. S.	3,851	10,000	5,000
Tomball	1929, 33	1933	T. Bal. & Geol.	10,070	50,000	25,000
Houston County						
Kitrell	1932	1934	Geol. & Geoph., later	.....	2,500	?
Jefferson County						
Amelia	1934-35	1936	T. Bal. & Rfl. S.	2,069	20,000	10,000
Cheek	1929, 33-38	1938	T. Bal. & Rfl. S.	20	3,000	1,500
Jefferson Coast	1932-37	1938	T. Bal. & Seism., Geol	.....	.....	.....
La Belle	1929	1937	T. Bal.	104	1,000	1,000
Nome	1932	1936	T. Bal. & Geol.	901	10,000	5,000
West Beaumont	1935, 36	1936	Geoph.	604	4,000	1,000
North Cheek	1935-36	1937	T. Bal. & Rfl. S.	54	5,000	2,500
Liberty County						
Cleveland	1931	1933	T. Bal., Seism., Pend.	996	2,504	500
Esperson	1928	1929	T. Bal.	5,036	9,000	9,000
Hankamer	1926-28	1929	T. Bal.	5,122	7,500	7,500
Hardin	1934(?)	1935	Geol., later by T. Bal., etc.	1,052	8,500	1,000
Matagorda County						
Mad Island	1930	1930	T. Bal.	.....	.....	.....
Sheppard's Mott	1928	1935	T. Bal. & Geol.	2	?	?
Montgomery County						
Magnolia	1936, 37	1938	T. Bal., Rfl. S., Geol.	.....	.....	?
Newton County						
Call	1933-36	1937	T. Bal. & Rfl. S.	10	1,500	750
Sabin Tram Block (2)	1936	?	T. Bal. & Rfl. S.	.....	?	?
Polk County						
Ace	....	1933	T. Bal. & Trend Play	114	500	250
Livingston	?	1932	T. Bal. & Geol.	4,646	15,750	8,000
Segno	1933	1936	Rfl. S. & T. Bal.	789	10,000	5,000
Tyler County						
Spurger	....	1937	T. Bal. & Rfl. S.	191	5,000	2,500
Wharton County						
Five Corners	1934-35	1936	T. Bal. & Rfl. S.	Included with Withers		
Blue Basin	1932	1937	T. Bal. & Rfl. S.	Gas	Gas	Gas
Magnet	1931	1936	T. Bal.	291	9,000	9,000
Picket Ridge-Kubela	1934	1935	T. Bal. & Rfl. S.	1,689	1,000	5,000
Spanish Camp	1934	1936	Geoph. & Seism.	.....	Gas	.....
Withers	1934	1936	T. Bal. & Rfl. S.	1,166	20,000	10,000
Total for Texas Gulf Coast Area						960,000

LOUISIANA GULF COAST

Acadia Parish						
Bayou Mallet	1934	1935	Rfl. S. & T. Bal.	141	1,000	250
South Crowley	1934	1938	T. Bal. & Rfl. S.	2	1,000	500
Tepatate	1934	1935	T. Bal. & Rfl. S.	4,738	20,000	10,000
Allen Parish						
Oberlin	1937	...	Geoph.	.....	.....	.....
Ascension Parish						
Darrow	?	1932	T. Bal.	1,631	15,000	15,000
Calcasieu Parish						
English Bayou	1933	1935	T. Bal. & Rfl. S.	Included with Gillis		
Gillis	1928	1934	T. Bal., Rfl. S., Rfr. S., Geol.	14,673	22,000	6,000
Iowa	1929	1931	T. Bal., Seism., Geol.	32,096	45,000	15,000
Cameron Parish						
Cameron Meadows	1929	1931	T. Bal., Seism., Geol.	5,650	15,000	5,000
Evangeline Parish						
Villa Platte	1936	1931	T. Bal., Seism., Geol.	303	15,000	5,000
Jefferson Davis Parish						
Roanoke	1928	1934	T. Bal., Seism., Geol.	6,726	13,000	4,300
South Elton	1935	1937	Geoph. & Rfl. S.	11	1,000	(?) 200
South Jennings	1934-35	1936	T. Bal. & Rfl. S.	6	1,000	500
Woodlawn	1937	1938	T. Bal., Seism., Geoph.	20	1,000	350
St. James Parish						
Convent Hester	1935	1936	T. Bal. & Rfl. S.		Salt Dome	
St. Martin Parish						
Lake Mongouloui	1927, 34	1936	T. Bal., Geoph.		Salt Dome	
St. Martinsville	1934, 35	1935	T. Bal., Seism., Geol.	68	2,000	650
St. Mary Parish						
Charenton	1934	1936	T. Bal., Rfl. S., Geol.	664	10,000	3,350
Terrebonne Parish						
Lirett-Houma Gas F	1935	1937	T. Bal., Rfl. S., Geol.	35	1,000	350
Vermilion Parish						
Abbeville	1929	1937	Rfl. S., Geoph.	123	5,000	1,000
Total Louisiana Gulf Coast Area						67,500
Total Texas Gulf Coast Area						960,000
GRAND TOTAL LOUISIANA-TEXAS GULF COAST						1,027,500

Note: Based on data by Charles Leyendecker, The OIL WEEKLY staff, and others.

T. Bal.—Torsion Balance. Geol.—Geology. Rfl. S.—Seismic. Rfr. S.—Seismic. Grav.—Gravimeter. Pend.—Pendulum. Geoph. Geophysics. Seism.—Seismic. Magn.—Magnetometer.

Extended European war would consume much petroleum

[*Continued from page 15*]

roughly repeat itself for the oil industry, therefore, this new war would bring greatly increased foreign demand for gasoline, materially larger exports of fuel oil and lubricants, but a decline in shipments of kerosene.

Oil in Japanese War

Probably more helpful than the history of the World War era in forecasting oil requirements for the present war is the record of oil consumption in the current Sino-Japanese war. For Japan has been fighting the modern way, with war planes and motorized armies. In that war, Japan has consumed large quantities of petroleum products, and United States oil exports to Japan have been great. Whereas the total crude oil, gasoline, and fuel oil shipments to Japan were only around 20,000,000 barrels in 1935 and 1936, they jumped to 27,750,000 barrels in 1937 when the current campaign began, and rose further to 31,096,000 barrels in 1938. This year, the shipments are somewhat lower. The exports of 1938 were approximately 50 percent greater than those of 1936.

Civilian Use a Factor

Although it is indicated that large quantities of oil will go to Europe for military purposes, it is to be expected that shipments to belligerents for normal purposes may be substantially curtailed and that exports to neutral countries possibly may be forced down because of the disordered conditions. Already the belligerents have restricted civilian use of gasoline as well as other materials, in efforts to conserve needed resources. To what extent the curtailment of normal consumption will offset the gain in military requirements remains to be seen. And so an important uncertainty is involved in the outlook for oil exports.

In so far as the United States and South American oil industry is concerned, moreover, the possibilities for export business in the new war will be materially affected by developments which have not yet transpired.

Particularly significant, for example, will be the course pursued by Italy. If the Mediterranean is kept open to British and French commerce, oil from the East will fill a material part of the requirements of the Allies. Otherwise, the Western powers probably will draw more heavily on the Americas.

Germany expects to obtain oil from Russia and perhaps Roumania. But it is not yet clear exactly how Germany's needs actually will be fulfilled.

A great deal of uncertainty remains in the outlook for the oil industry of the United States, therefore, despite the expectations of

United States Exports of Major Refined Products Increased After Temporary Interruption in World War Period

(All figures in barrels, except wax, which is reported in pounds)

YEAR	Gasoline	Gas Oil & Fuel Oil	Kerosene	Lubricants	Total Gasoline, Gas Oil & Fuel Oil, Kerosene & Lubricants
1914	3,880,000	15,110,000	24,059,000	4,563,000	61,457,000
1915	2,681,000	19,050,000	19,927,000	5,706,000	47,364,000
1916	4,000,000	22,800,000	20,350,000	6,210,000	53,360,000
1917	5,361,000	26,749,000	15,670,000	6,677,000	54,457,000
1918	8,400,000	28,589,000	11,693,000	6,127,000	54,809,000
1919	8,860,000	13,925,000	23,313,000	6,543,000	52,641,000
1920	15,250,000	19,705,000	20,730,000	9,574,000	65,259,000
1921	13,025,000	20,120,000	17,833,000	6,888,000	57,866,000

Exports of Crude Oil from United States During World War Period

Figures in barrels; from *Mineral Resources*

YEAR	DESTINATION								Total North America	South America	Total Shipments from U.S.
	France	British Isles	Spain	Italy	Germany	Total Europe	Canada	Mexico			
1914	244,869	*	272,745	.....	*	874,328	1,508,492	219,227	1,922,475	173,118	2,969,894
1915	17,177	*	160,004	.....	.....	463,134	2,597,544	241,254	3,128,444	32,590	3,768,168
1916	156,809	*	59,498	.....	.....	258,604	2,966,659	189,821	3,469,294	55,064	4,095,902
1917	7,902	*	58,622	.....	.....	74,115	3,329,356	47,725	3,681,442	56,245	4,098,123
1918	.....	*	92,597	.....	.....	117,253	*	*	*	*	4,900,691
1919	*	50,000	97,000	.....	64,000	*	5,269,000	*	*	*	6,019,000
1920	92,000	88,000	206,000	.....	209,000	*	6,472,000	*	*	833,000	8,757,000
1921	114,000	114,000	*	.....	377,000	*	7,167,000	*	*	*	8,940,000

* Indicates an unreported amount.

Exports of Gasoline from the United States During World War Period

Figures indicate gallons and are from *Mineral Resources*

YEAR	DESTINATION								Total North America	South America	Total Shipments from U.S.
	France	British Isles	Spain	Italy	Germany	Total Europe	Canada	Mexico			
1914	32,367,031	36,023,611	.....	7,164,733	3,750,361	95,014,904	33,457,063	.....	33,457,063	15,007,405	162,669,038
1915	13,356,497	18,928,206	.....	3,651,600	.....	43,091,227	33,874,220	.....	33,874,220	17,941,922	112,562,929
1916	44,405,796	45,530,888	.....	8,241,455	.....	108,987,331	25,312,456	.....	25,312,456	10,049,568	167,923,200
1917	56,066,313	54,574,416	.....	30,686,430	.....	148,186,651	27,647,086	.....	27,647,086	11,388,908	224,811,491
1918	104,667,824	121,294,120	.....	49,603,064	.....	*	*	.....	*	*	351,967,164
1919	*	*	*	*	*	*	*	*	*	*	372,120,000
1920	*	*	*	*	*	*	*	*	*	*	641,298,000
1921	*	*	*	*	*	*	*	*	*	*	546,064,000

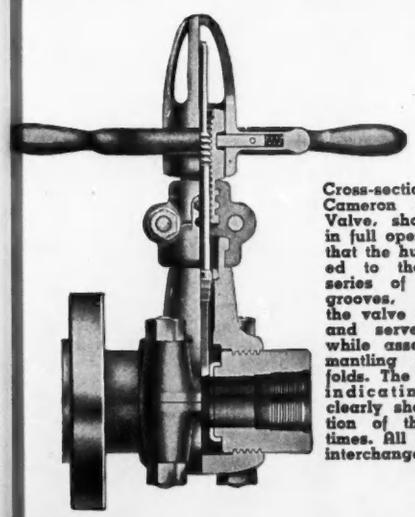
* Indicates unreported amount.

CAMERON FLEX-SEAL MUD VALVES

DRILL 36,700 FEET OF HOLE WITHOUT REPAIR COST!

ACTUAL SERVICE RECORD:

Date placed in service — July 2, 1938. Number active service months — 13; Class of service — mud line (standpipe). Number wells drilled — 4. Average depth per well — 9,200'. Maintenance cost — none.



Cross-section view of a Cameron Flex-Seal Mud Valve, showing the gate in full open position. Note that the hubs are connected to the body by a series of shoulders and grooves, which permits the valve to swivel freely and serve as a union while assembling or dismantling in mud manifolds. The valve is of the indicating stem type, clearly showing the position of the gate at all times. All parts are freely interchangeable.

Cameron Flex-Seal Mud Valves continue to set new records for low-cost, trouble-free mud line service. Take, for example, the two Cameron Valves shown above, which were installed on a major producing company's rig in coastal Louisiana 13 months ago. To date, after drilling approximately six and one-half miles of hole, they have required absolutely no maintenance. Eventually, they will require new resilient flow-way inserts and stem packers (total cost for 2" size — $6.15; for 4" size — $10.75), which will make them practically as good as new again. Members of the drilling crew will make these repairs at the rig, and with ordinary rig tools.

The remarkable capacity of Cameron Flex-Seal Mud Valves to withstand the destructive action of abrasive-laden fluid, moving at high pressure and velocity, is attributed to the unique renewable resilient flow-way insert. At a very slow rate of wear, this rubber, or neoprene, insert absorbs the cutting action and provides a leak-proof seat for the heat-treated alloy steel gate. Unlike all other gate valves, there is no metal-to-metal seal. Even though the gate may be sand-cut or damaged, after long service, a pressure tight seal is effected when the gate is embedded in the resilient insert. Cuttings, or other foreign matter, are readily embedded in the insert upon closing the gate. The valve opens and closes easily under 6000 lbs. pressure.

Operators who are experiencing difficulty with conventional types of mud valves are invited to try a Cameron Flex-Seal Mud Valve, or write for fully descriptive literature.

CAMERON IRON WORKS, INC.

711 MILBY ST., HOUSTON, TEXAS

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CALIFORNIA DISTRIBUTOR — THE HOWARD SUPPLY CO., LOS ANGELES

World Consumption of Petroleum and Related Products for Military Purposes in 1937*
(U. S. Barrels)

COUNTRY	Motor Fuel	Gas and Fuel Oil	Lubricants	Total
Argentina	58,700	742,000	3,900	804,600
Austria	10,700	.....	300	11,000
Belgium	83,500	.....	2,700	86,200
Brazil	32,900	439,000	2,200	474,100
British Empire	1,637,000	10,526,000	81,800	12,244,800
Bulgaria	5,400	.....	200	5,600
Chile	62,000	500,000	3,400	565,400
China	75,400	400,000	3,500	478,900
Cuba	.....	116,000	300	116,300
Czechoslovakia	26,900	.....	800	27,700
Denmark	25,000	120,000	1,100	146,100
Finland	5,400	116,000	500	121,900
France	1,578,000	4,600,000	64,000	6,242,000
Germany	1,403,000	1,000,000	47,600	2,450,600
Greece	57,000	275,000	2,500	334,500
Hungary	10,700	.....	300	11,000
Italy	1,559,000	3,465,000	60,000	5,084,000
Japan	1,077,000	6,200,000	51,800	7,328,000
Mexico	10,700	.....	300	11,000
Netherlands†	.....	660,000	1,900	661,900
Norway	.....	300,000	900	300,900
Poland	219,000	.....	6,600	225,600
Portugal	17,200	200,000	1,100	218,300
Rumania	345,500	.....	10,800	356,300
Russia	1,575,000	1,498,000	55,000	3,128,000
Spain	482,000	742,000	17,600	1,241,600
Sweden	115,700	630,000	4,700	750,400
Turkey	138,900	320,000	5,300	464,200
United States	1,188,000	9,210,000	61,800	10,459,800
Yugoslavia	26,900	.....	800	27,700
Others	315,000	3,240,000‡	11,400	3,566,400
	12,141,500	45,299,000	505,100	57,945,600

* In addition, about 70,000 barrels of miscellaneous products were consumed for military purposes during 1937.

† Includes Netherlands Indies.

‡ Includes 2,240,000 barrels of fuel oil consumed by the armies of countries shown in this table and on which no segregation by countries was attempted.

From Petroleum Development and Technology, 1938, (published by American Institute of Mining and Metallurgical Engineers) compiled by V. R. Garfias, R. V. Whetsel and J. W. Ristori.

eventual large exports for war purposes.

And still more uncertainty surrounds the long-term outlook, as the war may be expected to cripple the world and prevent genuine prosperity for years.

Not Like in 1914

In attempting to foresee what may be expected for the oil industry in the present war period, the history of conditions during the World War currently is under close scrutiny.

However, it appears dangerous to draw conclusions now from what happened then. In the first place, the whole economic reaction is proving different. Whereas the New York stock exchange was closed down for five months after declaration of war in 1914, following dumping of stocks and precipitate decline in prices, the prices were pushed sharply upward when this war broke out. There has not been this time the general demoralization that prevailed then. The world was prepared for this conflict, whereas the World War broke out suddenly and without advance warning. Governments and business men have been preparing for months for the war that finally has come, and are relatively well situated for handling present difficulties.

In the final quarter of 1914 and the first quarter of 1915, industrial operations were curtailed throughout the world and expansion plans were cancelled. And there was not a recovery from the shock of the war's beginning until the middle of 1915.

In this war, in the absence of so great a shock, industry is expected to go ahead immediately, with increased activity, in anticipation of an expansion of demand such as that which finally got under way in 1915, when the Allies began drawing heavily on the United States for materials and supplies.

United States industry in general is expected to be stimulated immediately by enlarged demand from South America, with the fighting countries forced by the exigency of war to give up much of their foreign trade and to concentrate on taking care of their own war needs.

Subsequently, it is believed, American commerce will begin to feel the effects of Europe's war requirements, with men of the beligerants out of the factories and fields.

Resumption of commerce with Europe, following the temporary interruption at the war's commencement, is expected to usher in a boom.

However, governments throughout the world now exercise stricter economic controls than at the outset of the World War, and it is conceded that a new war boom might not be as spectacular as that which arose out of the 1914-1918 war.

Shipping Interrupted

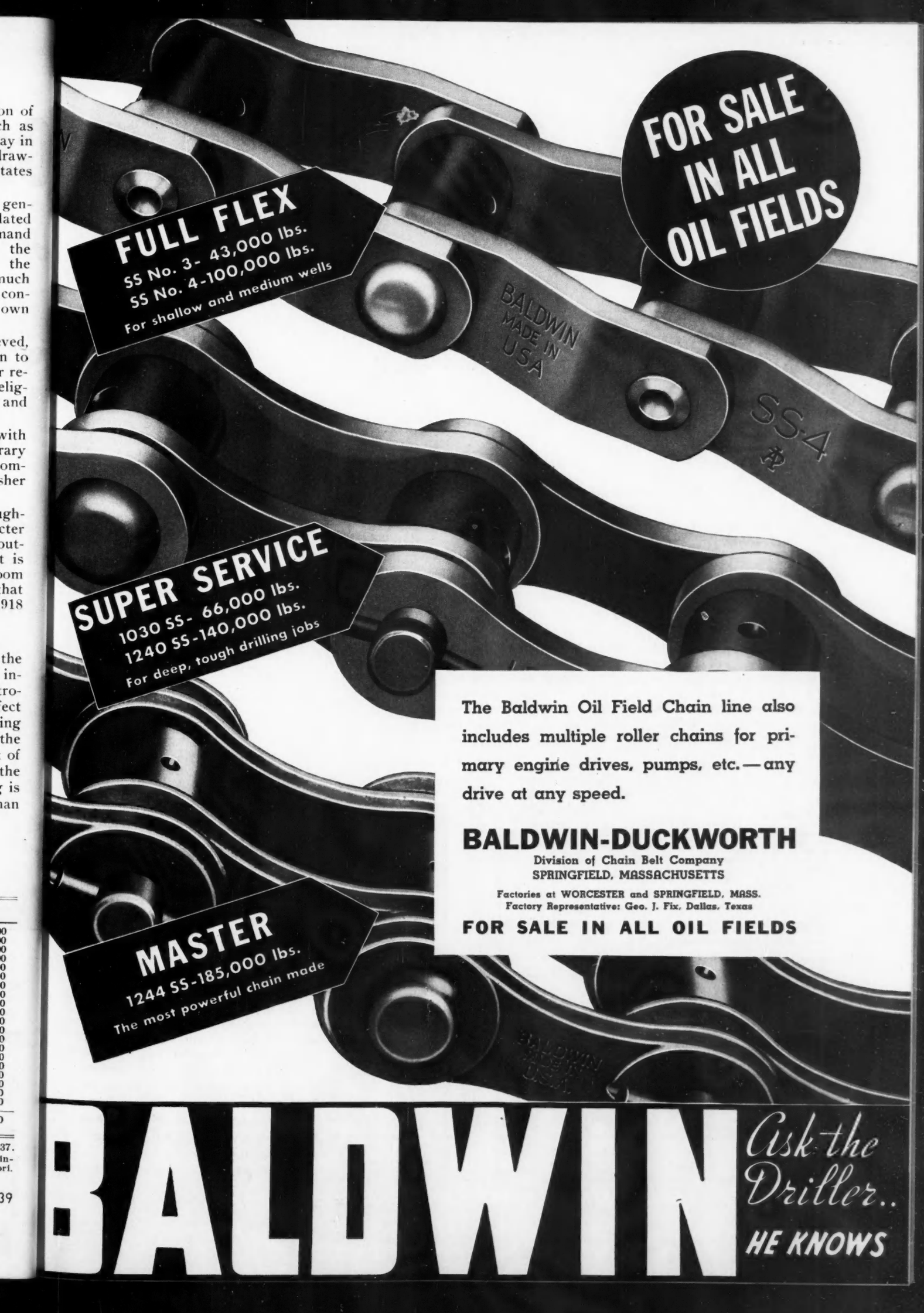
Although it is indicated that the new war eventually will cause increases in consumption of petroleum products, the immediate effect has been a disruption of shipping of all commodities throughout the world, as at the commencement of the World War. However, the present interruption of shipping is expected to prove less serious than

World Consumption of Petroleum and Related Products by Military Air Forces in 1937*
(U. S. Barrels)

COUNTRY	Personnel	Planes	Motor Fuel	Lubricants	Total
Argentina	1,750	175	48,000	1,600	49,600
Belgium	2,370	225	62,000	2,100	64,100
Brazil	4,000	75	20,000	700	20,700
British Empire	57,040	4,800	1,337,000	44,000	1,381,000
Chile	2,040	225	62,000	2,100	64,100
China	2,500	250	70,000	2,300	72,300
Denmark	1,100	90	25,000	800	25,800
France	54,000	4,700	1,309,000	43,000	1,352,000
Germany	50,000	4,500	1,253,000	41,000	1,294,000
Greece	6,750	150	42,000	1,400	43,400
Italy	50,000	4,500	1,253,000	41,000	1,294,000
Japan	40,000	3,000	835,000	27,000	862,000
Poland	8,000	400	112,000	3,600	115,600
Rumania	15,000	1,000	281,000	9,000	290,000
Russia	150,000	4,500	1,253,000	41,000	1,294,000
Spain	5,200	500	240,000	8,600	248,600
Sweden	4,700	300	105,000	2,700	107,700
Turkey	10,000	400	112,000	3,600	115,600
United States	35,000	3,400	946,000	31,000	977,000
Others	3,500	350	100,000	3,400	103,400
	502,950	33,540	9,465,000	309,900	9,774,900

* In addition, about 40,000 barrels of miscellaneous products were consumed by military air forces in 1937.

From Petroleum Development and Technology, 1938, (published by American Institute of Mining and Metallurgical Engineers) compiled by V. R. Garfias, R. V. Whetsel and J. W. Ristori.



The Baldwin Oil Field Chain line also includes multiple roller chains for primary engine drives, pumps, etc.—any drive at any speed.

BALDWIN-DUCKWORTH

Division of Chain Belt Company
SPRINGFIELD, MASSACHUSETTS

Factories at WORCESTER and SPRINGFIELD, MASS.
Factory Representative: Geo. J. Fix, Dallas, Texas

FOR SALE IN ALL OIL FIELDS

BALDWIN

Ask the Driller..
HE KNOWS

that in 1914, as the world is better prepared now for the emergency conditions.

Last week, many ships were tied up in neutral ports, awaiting orders from their governments; those loaded with cargoes for ports of fighting countries having been instructed to seek the safety of neutral ports.

In various ports, British ships were painted gray and sailed for Europe. They included several oil tankers that had been loaded on the Gulf Coast, and it was believed the tankers would join warship convoys at Bermuda or on the Canadian coast for the voyage across the Atlantic.

Ickes hopes United States oil prices and production will not be increased

Administration officials at Washington this week prepared to move promptly to protect the nation's natural resources against exploitation, Secretary of the Interior Harold L. Ickes expressing the government view that there must be no "rape" of those resources by those seeking war-time profits.

Declaring there is no "legitimate" reason for an increase in commodity prices because of the European war, the secretary said that a study may be made of federal powers to protect natural resources and disclosed that he anticipated attempts by war profiteers to exploit our oil and other resources.

"Almost as much destruction could be brought to our national resources through internal exploitation as if we were invaded by a foreign nation," he declared.

"I am apprehensive that there will be the usual effort made by petroleum interests to rape our natural resources for the sake of war profits. I think that true neutrality means keeping our natural resources for ourselves and our children. We ought not to allow exploitation of our resources for exportation."

At the present time, the secretary admitted the government is powerless to do anything to prevent unrestrained increases in oil production to meet foreign demand, and the authorities of the producing states could easily increase the allowable production.

Secretary Ickes took advantage of the opportunity to renew criticism of the Connally Act and Interstate Compact, which originally he opposed, declaring that "the present oil laws are largely price-boosting laws."

"There is no true conservation law in the United States so far as I know," he added.

At the same time, he said, war-time emergency laws passed during the World war period are still on the books and could readily be revived.

Sudden increases in the prices of many commodities, some of which would not be seriously affected immediately by war conditions, focussed attention in the capital on the steps taken by European nations, notably England, to "freeze" prices at the level of August 31, and there were indications that in the event profiteering spreads, Congress will be asked immediately to enact legislation giving the administration control over essential industries.

Wallace Opposes

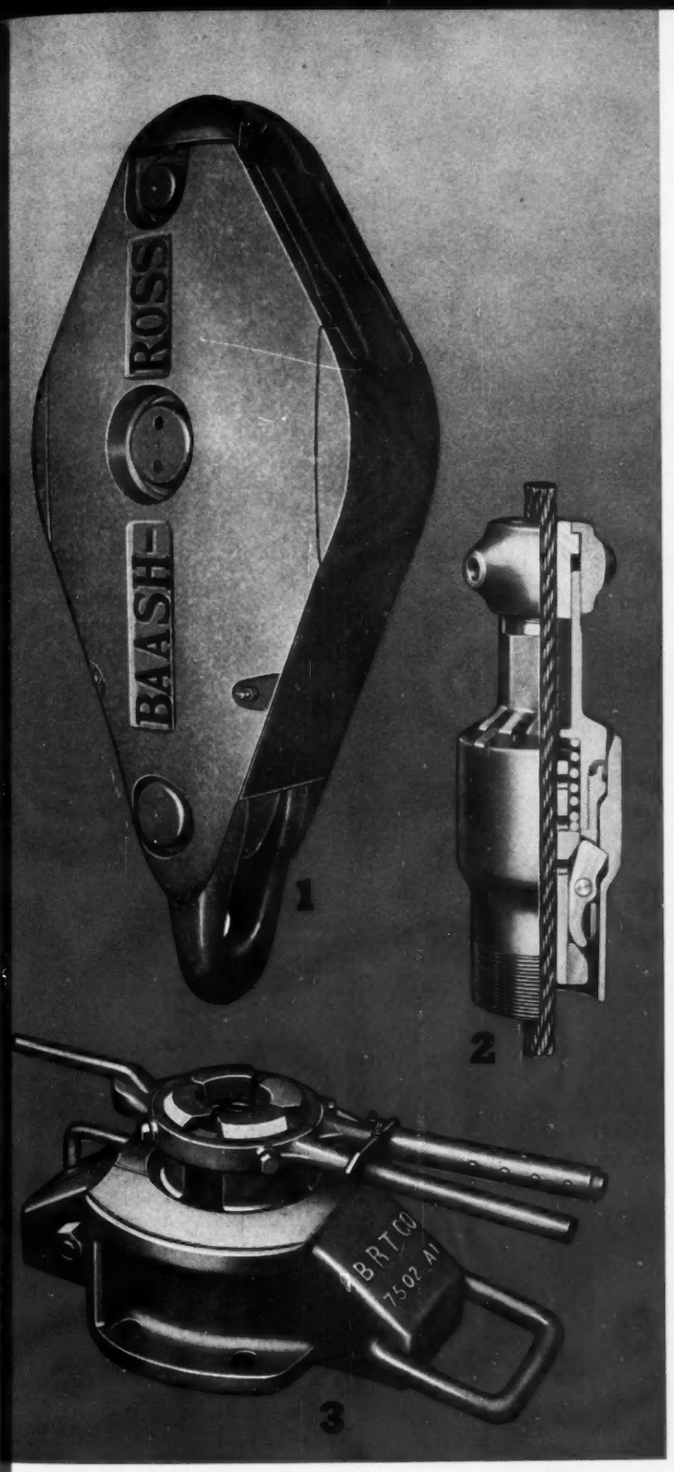
Administration officials, from President Roosevelt down, are determined that there shall be no profiteering, but Secretary of Agriculture Wallace saw in the present situation the possibilities of the farmer getting parity prices, a goal at which the administration has aimed unsuccessfully throughout the past six years. Accordingly, there is something of a split over the price question, with Wallace urging that the farmer be allowed to benefit and other officials anxious to keep prices at the present level.

Any legislation dealing with industrial control would, of necessity, provide for government supervision of the petroleum industry which is not only one of the country's major businesses but a highly important factor in war.

The several years of President Roosevelt's administration has had as one of its goals the increase of commodity prices.

Sharply Higher Oil Security Prices Indicate Traders Expect Industry to Profit from War
Oils rose much more sharply than industrial stocks in general following declaration of war September 3. This table shows that the average price of 34 oil company stocks at the close of trading September 6 was 18.6 percent higher than on August 1, whereas the Dow-Jones average for 30 industrial stocks was up only 3.3 percent. The oils boomed, along with steels, coppers, and some of the chemicals.

COMPANY	Aug. 1, 1939	Sept. 1, 1939 (Friday Before War Began)	Sept. 5 1939 (First Trading After War Declared)	Sept. 6, 1939	Net Change Aug. 1, to Sept. 6
Amerada Corporation	63½	59	69	68¾	+ 5¼
Atlantic Refining Company	20	18¾	22	21½	+ 1½
Barnsdall Oil Company	13¾	13⅛	17⅞	17	+ 3¼
Consolidated Oil Company	7½	7	8⅝	9¼	+ 2
Continental Oil Company	21⅝	22¼	30	28⅞	+ 7½
Creole Petroleum Company	20	20½	24¼	25	+ 5
Gulf Oil Corporation	31⅝	34⅜	42¼	39¾	+ 8⅛
Houston Oil Company of Texas	5⅞	5⅛	8⅝	8⅛	+ 2¼
Humble Oil & Refining Company	58¼	55¼	68	66¾	+ 8½
Imperial Oil, Ltd.	15½	13½	14⅞	14⅜	— ¾
International Petroleum Company	21¾	18¾	23½	23⅛	+ 1⅜
Lion Oil Company	12⅞	13⅞	17½	17⅝	+ 4¾
Mid-Continent Petroleum Company	13	13	17	16½	+ 3½
Mid-West Oil Company	7⅜	7	7½	7½	+ ⅛
Mountain Producers	5½	5	5⅝	5½	+ ⅛
Ohio Oil Company	6⅞	6⅝	10	9¼	+ 2⅜
Phillips Petroleum Corporation	35¾	36¼	44¼	43	+ 7¼
Plymouth Oil Company	19½	18	22⅝	22½	+ 3
Pure Oil Company	7	7¼	11	10½	+ 3½
Seaboard Oil Company	19	17	22	21¾	+ 2¾
Shell Union Oil Company	11	11	15½	15¼	+ 4¼
Skelly Oil Company	19	17¾	23¾	23	+ 4
Socony-Vacuum Oil Company	11¾	11⅜	14⅝	14¼	+ 2½
South Penn Oil Company	31	24½	36	35	+ 4
Standard Oil Company (California)	26½	26	30	30¾	+ 4⅜
Standard Oil Company (Indiana)	25½	23⅞	27⅞	28	+ 2½
Standard Oil Company (Kentucky)	18⅝	17¾	18	18⅛	+ ⅛
Standard Oil Company (New Jersey)	41¾	41¼	48¾	48½	+ 6¾
Standard Oil Company (Ohio)	24⅝	21½	26¾	25½	+ 1⅛
Sun Oil Company	50	45¾	51¾	52	+ 2
Texas Corporation	36¾	37¼	46½	45⅞	+ 9⅛
Texas Pacific Coal & Oil Company	7⅝	7⅜	10	9½	+ 1⅞
Tide Water Associated	11⅛	10	13¾	13⅜	+ 2¼
Union Oil Company of California	16¾	15¾	19⅝	18⅝	+ 2⅜
Average 34 Oil Stocks	21.194	20.688	25.511	25.135	+18.6%
Dow-Jones Average (Industrials)	143.36	135.25	148.12	148.04	+ 3.3%



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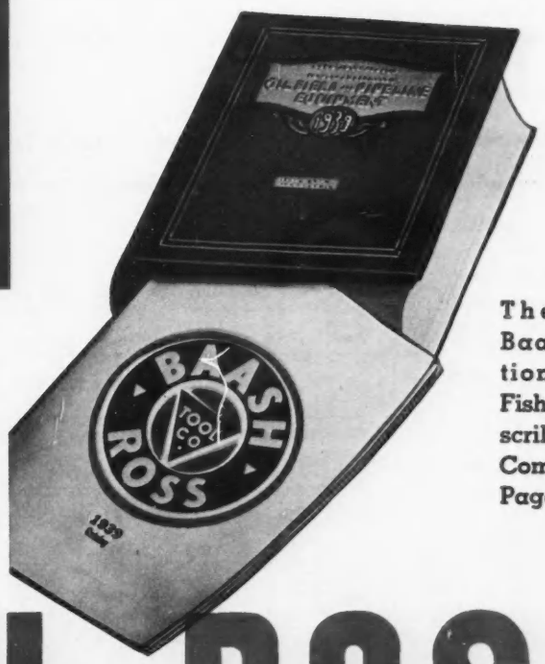

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Where will warring nations obtain their oil?

[*Continued from page 17*]

easier access to the larger producing areas of the world, it appears that these allies are more fortunately situated with respect to obtaining adequate supplies. In addition, England has territorial possessions that produce considerable oil and has financial interests in developments in other regions that give them first call.

Naturally, both England and France are looking to the United States for much of their oil supply. It is one of the shortest distances to sizeable volumes. However, they have other sources open to them also.

If Italy continues neutral in the war, Great Britain and France will be able to draw heavily on Iran and Iraq for petroleum needed for western front activities. Iraq Pipe Line Company's terminals on the Mediterranean Sea would be used to load tankers destined for ports in southeastern France. While an occasional tanker loss might be experienced if the German submarine fleet functions efficiently, it is generally thought England and France will be able to give effective protection for most shipments across the Mediterranean.

The countries have another source of supply in Canada. Crude can be shipped in tank cars to the eastern seaboard and freighted across the north Atlantic.

South America probably will be drawn on heavily by the French and English. Navigation of the Caribbean and Atlantic will be involved, a situation which will render tanker trips distinctly hazardous. From west to east the main ports of exports are Cartagena, Maracaibo, Guanta and Port-of-Spain. To these soon will be added Covenas, tidewater terminal of the Barco line, now under construction in Colombia.

Of these South American sources of oil, Trinidad, an English colony, is closest to Europe.

As to Peru, it seems logical to presume that most of her export shipments will continue to be routed to Canada for transshipment to England.

It is interesting to note that most of the oil available for export from the above-mentioned South American countries is controlled by interests who would favor a French-English victory.

Another major source of supply for these nations is afforded by India. If oil is shipped from India to England or France it may be routed two ways: across the Indian Ocean and Arabian Sea, thence either up through the Persian Gulf to Abadan or up through the Red Sea to the Suez Canal. (In peace times oil from Abadan, Iran, is routed around the Arabian Peninsula and up to the Suez Canal.) Or it may be shipped around the southern tip of Africa and thence on up to England or France. In either case the passage would be a dangerous one, highly liable to attack by enemy ships notwithstanding the preponderance of British and French controlled islands in the Indian Ocean, points from which war vessels could be operated. It was in this territory that Count Felix von Luckner, the sea raider, operated so effectively for Germany during the last World War.

Barrels of Oil in Storage in Various European Countries

	January 1, 1937	January,1 1938
Russia	69,236,000	72,055,000
France	18,443,000	19,773,000
Germany	10,573,000	10,390,000
Rumania	9,233,000	6,996,000
Italy	6,503,000	5,047,000
Netherlands	2,649,000	3,492,000
Sweden	1,424,000	1,909,000
Hungary	1,103,000	1,391,000
Austria	991,000	978,000
Switzerland	384,000	384,000
	120,539,000	122,415,000

Note:—It is not known if the figures here include oil stocks for military purposes.

Taken from New York Times, September 18 1938 and presented in Petroleum Development and Technology, 1939, (published American Institute of Mining and Metallurgical Engineers, by V. R. Garfias, R. V. Whetsel and J. W. Ristori.

Routes to Germany

While Great Britain and France are expected to have an easier time getting oil because of the greater naval power, Germany is not to be considered acutely pinched for oil as yet.

Through neutral countries it obtained vast petroleum supplies during the last World War. And, this time it may have even greater assistance in this respect, as its axis-partner, Italy, would be a logical oil buying agent for Germany as long as it remains neutral.

Italy, being contiguous to what was Austria, would have no trouble getting oil to Germany by that route. However, she might experience serious difficulty in obtaining sufficient petroleum to make substantial exports to Germany. Most of Italy's oil is imported. It comes through the Mediterranean, a fact which means it would be subject to interruption by the navies of France and England, provided

United States Shippers Own One-Fourth of World's Tanker Tonnage

Distribution of World Tanker Fleet, by Countries of Registry (As of June 30, 1938)

COUNTRY	Motorships No.	Motorships Gross Tons	Steamers No.	Steamers Gross Tons	Total Tankers* No.	Total Tankers* Gross Tons	Total Merchant Fleet† No.	Total Merchant Fleet† Gross Tons
British Empire:								
Great Britain and Ireland	186	1,440,282	224	1,231,937	410	2,672,219	6,843	17,675,404
Canada	9	83,563	19	41,164	28	124,727	1,431	1,832,059
Other Dominions	6	30,793	26	185,948	32	216,741	787	1,211,627
Belgium	9	64,923	..	.....	9	64,923	206	430,624
Denmark	12	97,116	2	9,670	14	106,786	694	1,129,556
France	10	77,791	30	164,105	40	241,896	1,246	2,880,783
Germany	19	110,303	12	91,918	31	202,221	2,321	4,231,657
Italy	14	81,974	64	298,514	78	380,488	1,156	3,258,992
Japan	27	239,315	12	106,534	39	345,849	2,187	5,006,712
Netherlands	65	411,774	47	150,172	112	561,946	1,473	2,852,012
Norway	207	1,585,896	55	386,573	262	1,972,469	1,963	4,613,175
Panama	41	388,172	8	62,089	49	450,261	134	611,207
Spain	10	56,113	6	20,812	16	76,925	793	947,963
Sweden	17	144,899	..	.....	17	144,899	1,239	1,571,054
U. S. S. R. (Russia)	24	115,311	3	7,898	27	123,209	680	1,272,897
United States	69	359,403	349	2,400,239	418	2,759,642	2,857	11,403,895
Others	8	19,078	65	251,401	73	270,479	3,399	5,940,534
Total	733	5,306,706	922	5,408,974	1,655	10,715,680	29,409	66,870,151

* All tankers 1,000 gross tons and over. Does not include sailing vessels and barges.
† All vessels 100 gross tons and over. Does not include sailing vessels and barges.
Authority: U. S. Maritime Commission, from Lloyd's Register. Taken from Petroleum Facts and Figures published by American Petroleum Institute.

Poland's Oil Would Help Germany

One of the objectives the German army craves to accomplish is the capture of Lwow oil fields in Poland, pictured above. Poland alone of all the warring nations produces enough oil within its own borders to take care of normal domestic demand. However, this is not a large quantity, amounting to but 3,827,000 barrels during 1938.

those nations saw fit to capture it; and the British government has placed oil on its list of contrabands of war and has declared its intentions of seizing such supplies on the high seas.

Assuming Russia's trade pact with Germany will result in shipment of considerable crude and refined products to take care of the latter's wartime requirements, regardless of the fact that the Soviet's increase in domestic consumption has been far more rapid than her gain in production, there are several possible means of getting that oil to Germany.

Significance was attached to reports that the Russians were in the market for large quantities of American drilling and producing equipment during the past week.

Russian Pipe Lines

Pipe lines running from the Caspian to the Black Sea provide for the movement of oil from the Baku, Grozny and other regions to ports on the latter water front. From this point the oil could be moved by tanker through the Dardanelles to Italy for rail shipment to Germany. However, this course probably will hold many dangers. Turkey's friendly attitude toward Great Britain would likely result in the British blocking the narrow Straits. Even if this did not occur, such a route would mean running the gauntlet of the eastern end of the Mediterranean Sea.

On the other hand Russia's oil for Germany could be shipped by rail to Leningrad on the Baltic Sea, or to East Prussia, from which points it could be relayed by short tanker runs to the northeast border of Germany. This would mean a long rail route, but appears safer due to the probability Germany will be able to keep the Baltic closed to British warships.

In the event that Germany conquers Poland and continues at war with France and England, it would be possible to move oil entirely by rail from Russia to German soil.

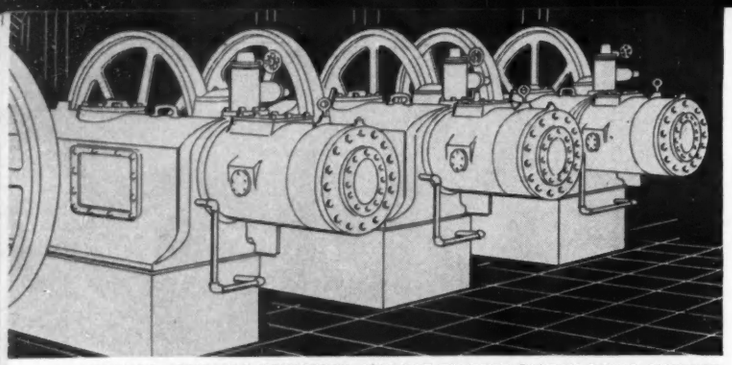
It is not known as to how well either Russia or Germany are equipped with tank cars, but it is assumed that Russia must be heavily equipped because of her problem of shipping oil from her western oil areas to her eastern frontier facing Manchukuo. Assuming that Russia will play a heavy part in furnishing Germany with oil, there is still the problem of Russia's undeclared war with Japan and the need for petroleum products on the Eastern front. How many tank cars she can spare for German shipments is problematical.

It must be remembered, however, that Germany fought one war almost without petroleum reserves, using synthetic fuel for her planes.

Germany Would Use Much Synthetic Oil

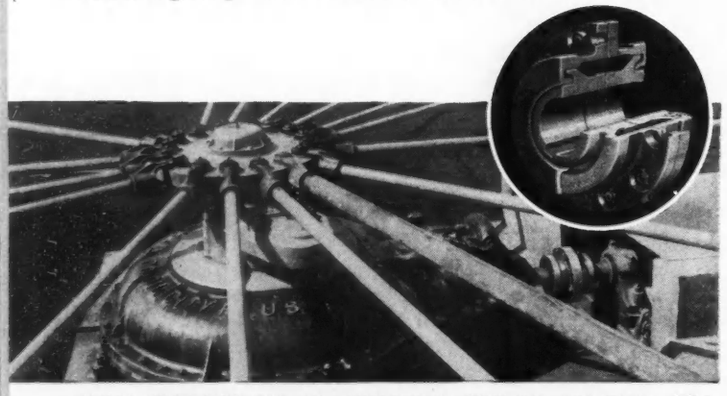
Although a gallon of gasoline produced synthetically in Germany costs nearly five times as much as the imported product made from crude oil, a glance into the oil supply situation in that nation leaves the impression that the synthetic plants will be exceptionally busy during the duration of the war.

Due primarily to acquisition of Austria, Germany's crude production in the first quarter of the year



KOPPERS AMERICAN HAMMERED SURFACE-TREATED PISTON RINGS STEPPED UP POWER OUTPUT AND PUMPING CAPACITY—Two 2-cycle gas engines equipped with American Hammered Piston Rings with the new ring surface treatment (developed by the Standard Oil Company of California) were stepped up from 180 RPM to 270 and 290 RPM respectively. The nominal 40 HP output was increased to 67 and 75 HP. The American Hammered Surface-treated Rings showed an increased length of service of 69% and 58% and pumped 24,500 additional barrels of fluid. American Hammered can furnish any of its rings with the new surface treatment. Write for details.

PRESSURE-CREOSOTED PILING COSTS HALF OF OTHER PERMANENT TYPE—Average costs of pressure-creosoted piling, driven in place, run around $1.10 a foot. Comparable prices for rigid type piles is around $2.20 a foot. Yet pressure-creosoted piling has definitely proved in oil fields and other waterfront work that it will last a great many years under the most difficult conditions. (There are records of creosoted piling lasting 30 or 35 years and more and remaining in excellent condition). Send for a copy of The Wood Preserving Corporation's booklet, "Oil From Water."



FAST'S COUPLINGS END OIL OPERATORS' COUPLING TROUBLES—This photograph shows a Fast's Self-aligning Coupling (manufactured exclusively by Koppers Company, Bartlett Hayward Division) driving an "Oilwell" No. 80-SC Oil-bath Geared Power for Nash and Windfohr Oil Corp., Graham, Texas: sixteen 2600 foot wells. With Fast's Couplings available, there is no need for any oil man to put up with expense or delays due to coupling troubles. The cut-away shows the construction of the Fast's Coupling, where the load-carrying surfaces are protected from wear by a positive film of oil. There is nothing to wear out; nothing to need attention other than oiling.

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was up 31 percent to a total of 1,622,062 barrels. Yet this figure was far short of the 5,150,000 metric tons estimate of Germany's peace time consumption of oil products.

Her total domestic production, much of which comes from hydrogenation of coal, is estimated at 1,850,000 tons, or about 35.9 percent of peace time requirements. However, of the gasoline she uses, Germany produces better than 52 percent of the estimated annual consumption of 2,345,000 tons. Her annual fuel oil production of 320,000 tons is 40½ percent of normal requirements. German production of Diesel oil, in heavy demand in time of war, represents an especially vulnerable spot. Before the war broke out she was using 1,385,000 tons of Diesel oil annually, of which only 120,000 was domestically produced. Her domestic production of lubricating oil, 140,000 tons annually, is only 25.9 percent of the 540,000 tons needed.

Those figures, compared with the estimates of war time needs of Germany made by Dr. F. Fridenburg in an article in the German Economist, indicate that hydrogenation plants, or any other type of plant capable of producing a substitute for a fuel or lubricant hitherto derived from crude oil, will be kept busy during the war. Dr. Fridenburg estimates the country's war time needs at from 12,000,000 to 20,000,000 tons annually.

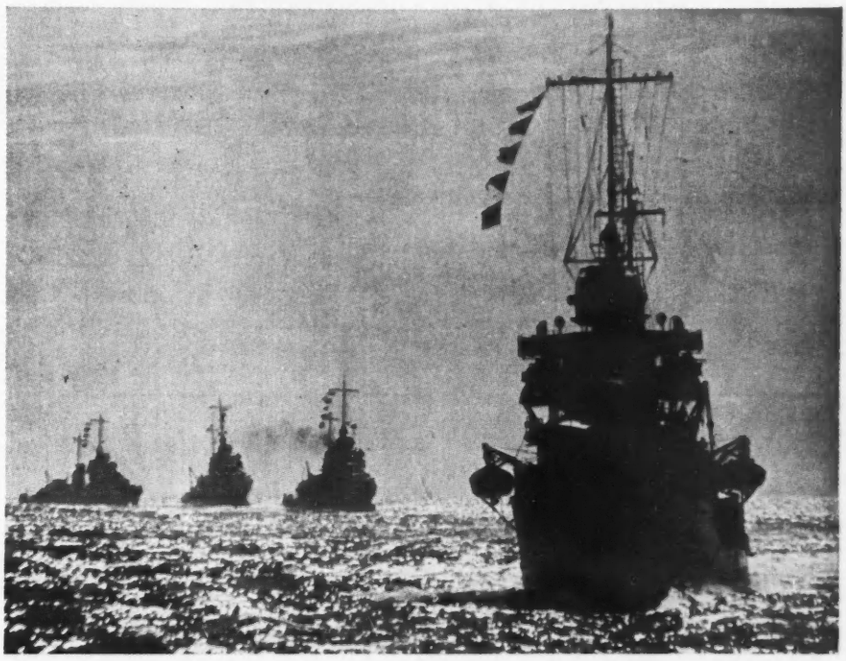
Dependence upon synthetic fuels to an important degree was indicated early in 1937. Prior to that time much publicity had been given advances made in the design and operation of German processes for manufacture of synthetic gasoline. Then when possibilities of the processes to help overcome a military weakness were realized, the German government issued orders that newspapers should devote no more space to articles dealing with hydrogenation and the like in Germany.

The following tabulation shows the locations and annual capacities (in tons) of a number of plants in Germany for production of fuels from lignite and coal:

Location of Plant	Annual Capacity
Leuna	350,000
Madgeburg	170,000
Bohlen	170,000
Gelsenkirchen	125,000
Rauxel	40,000
Holten	30,000
Homburg	25,000
Ruhland	150,000

When this list of plants was tabulated the Reich was offering every encouragement to those engaged in attempts to increase the country's capacity for manufacturing synthetic motor fuels and lubricants. It is reasonable to assume that the indicated total annual capacity of more than 1,000,000 tons annually has been increased since the shutdown on publicity dealing with hydrogenation plants. At one time Germany was producing annually from coal and lignite 265,000 metric tons of gasoline, 400 tons of lubricating oil, 55,100 tons of Diesel oil, 250,100 tons of fuel oil.

War Ships Will Require Much Fuel Oil



Mexican Shipments May Go to Germany

Due to resentment in certain British circles over Mexico's expropriation decree of March 18, 1938, which resulted in loss of producing oil properties of British, American and Dutch interests there, it is likely that her role as an exporter of war time petroleum products will be closely watched by France and England. This is especially true because of the fact that Italy and Germany have been her best customers since expropriation.

When the oil industry was privately operated in Mexico, that nation exported better than 20,000,000 barrels annually. This was made possible by a yearly production of 46,000,000 barrels. However, crude recovery in that nation has dropped considerably since March of last year, and the amount of oil available for export probably has dropped also.

Any cargo of oil leaving Mexico for Europe will have to go across the Gulf of Mexico and the Atlantic. That England will patrol tanker lanes across the Atlantic is taken for granted. Nearness of British West Indies to Tampico, chief port of export for Mexican oil, means England will have a base from which to conduct a fairly close patrol over the Gulf of Mexico as well as over the Caribbean.

The foregoing conditions may have been responsible September 7 for press dispatches from Mexico City to the effect that Mexico and W. R. Davis, New York oil broker, were about to cancel a $20,000,000 contract whereby Davis had been selling and bartering Mexican oil abroad.

Most of the oil had been going to Germany prior to start of the European hostilities, it was said.

Mexico is reputed to have about $6,000,000 tied up in credits in Germany.

French Seeking 10,000 Barrels of Oil Daily

An independent operator of Houston last week stated he had received an inquiry from French interests for 10,000 barrels of crude oil per day, which he was unable to handle. He said that other independent operators, when informed of the inquiry, indicated that none of them, nor an aggregation of them, were in position to deliver.

WORLD DEVELOPMENT and TECHNOLOGY

Edited by
WM. V. GROSS, Associate Editor

Canadian Fields

Turner Valley records two exceptional producers. Wildcat in Lloydminster district fills with oil.

COMPLETION of two large Turner Valley wells, an important oil strike on one wildcat structure, unconfirmed reports that a saturated core had been taken from a rank wildcat far north of present production, and announcement of three new tests for scattered areas in Southern Alberta were highlights of Canadian oil activity last week.

Big Well on Southwest

Anglo-Canadian Oil Company, Ltd.'s Extension 2, Legal Subdivision 11, Section 17, Township 18, 2-w5, near the southern edge of the southwest crude producing area of Turner Valley, flowed 3107 barrels through a two-inch choke during a 24-hour test, giving it the largest initial production under restricted flow. The record was taken from Frontier Royalties, Ltd.'s 1, which yielded 2719 barrels under a 2-inch choke test. Extension 2 was bottomed at 8254 feet, its completion in the Madison lime in five months being fast time for a Turner Valley well.

Also completed was Anglo-Canadian Oil Company, Ltd.'s No. 6, Legal Subdivision 3, Section 17, Township 18, 2-w5, with bottom at 8228 feet. Following a short test, officials announced that the well gave every indication of being a large producer and added that acid treatment would be given within a week.

Wildcat Shows

In the Lloydminster area on the Alberta-Saskatchewan border, Shaw Petroleums, Ltd.'s 2, Legal Subdivision 10, Section 25, Township 49, 1-w4, reported 700 feet of 15 gravity oil in the 1771-foot hole. The hole was reported almost entirely free of water, and a good flow of gas was accompanying the oil. Production is believed from the lower Cretaceous, corresponding to the formation from which the Shaw 1, ¾-mile west, and the Colony 2, 1½ miles east, are yielding gas. Gravity of the oil is about 3 degrees higher than that from the Lloydminster Royalties well on the same structure. A pumping unit was to be installed, and officials predicted the well would make a 300-barrel producer.

Reports that a saturated porous core had been taken from Benedum & Trees' Guardian Oils 1, Section 7, Township 80, 12-w6, far north and west of present Alberta production, could not be confirmed in Calgary. Roads to the isolated area were almost impassable in some cases. John E. Morrow, manager of the American firm's West Canadian activity, was proceeding to the field by airplane, while W. Jones, production manager of the company, had arrived at the well site from Pittsburgh. Morrow said that a production test would be made at the wildcat's present depth, 4785 feet.

On a block of 1700 acres and a location 13 miles south and west of the southernmost producing area of Turner Valley, Alberta Pacific Consolidated's Sheppard Creek 1 will be drilled on Legal Subdivision 6, Section 7, Township 16, 2-w5. The acreage includes that on which the old Alberta Assocated Oil Fields' Christie well was drilled years ago, this test having been abandoned after encountering excellent showings.

Wildcat Planned

British Dominion Oil & Development Corporation will drill near Willow Creek, a structure resembling Turner Valley and on which the company holds 1464 acres. The lime in this area is expected at about 3800 feet.

H. M. B. Inglis and associates will drill the third well on a site not yet determined in the south half of Township 13, Range 2-w5.

The Alberta Petroleum & Natural Gas Conservation Board last week ordered that drill stem or other tests of all possible oil

War in Europe Boosts U. S. Oil Equipment Sales Abroad

INCREASES in the sale of oil country equipment as the result of war demands for oil are probable in the near future.

That these increases will come both from domestic as well as foreign buyers is the opinion of equipment manufacturers checked on this question.

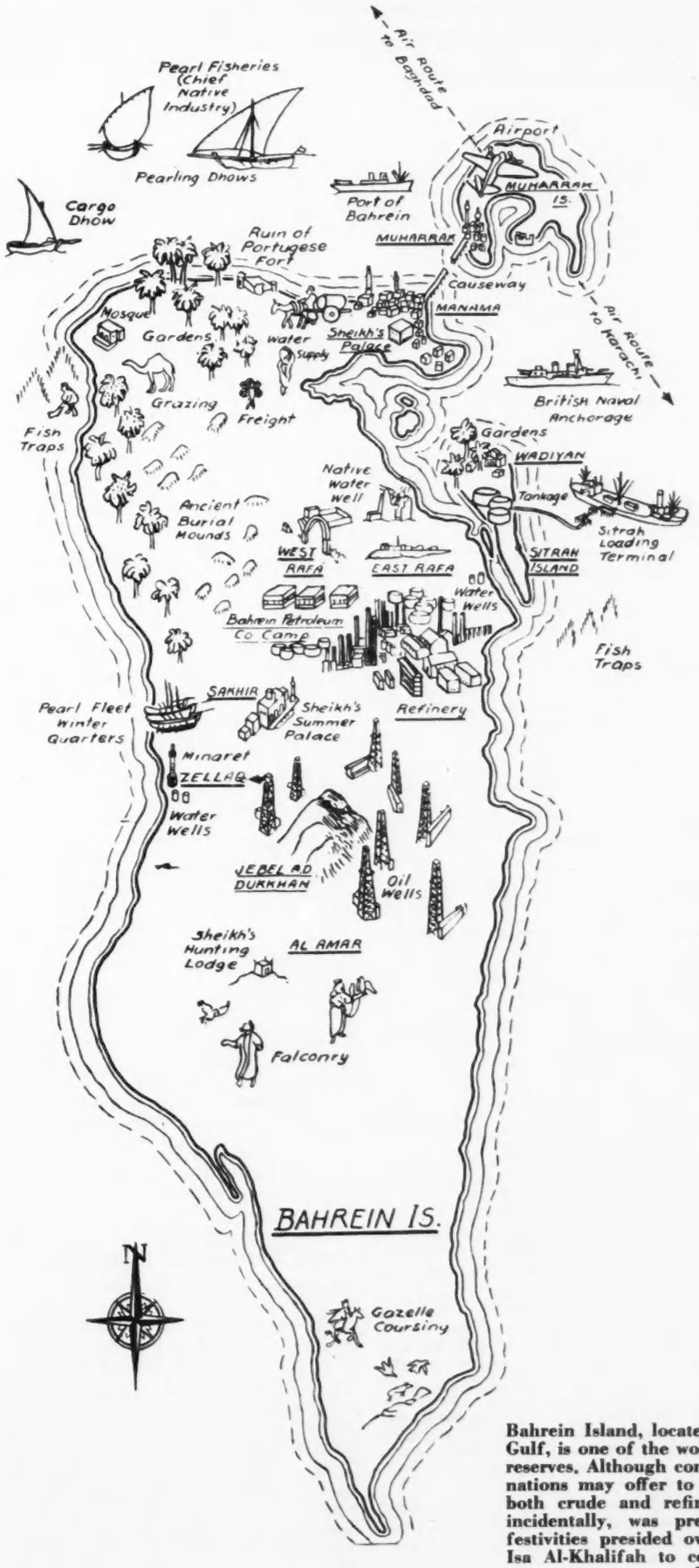
Last week one of the largest export orders placed in a long time by the Argentine government (Y. P. F.) was given an American supply company and the Russians, who have been comparatively small buyers of American oil country equipment for several years, were back in the market with inquiries, offering spot cash for purchases. Russia formerly was a heavy purchaser of American drilling and producing equipment, but for several years has either been making its own equipment or purchasing it from Germany. In the days when Russia was a purchaser long term credits were requested, but inquiries placed during the past week were being given on a basis of cash for payment.

Germany has shipped a considerable amount of pumping equipment to Argentina which shipments will very likely stop. German pipe also has been finding a market in South America, Mexico and other foreign countries. Some of it has come into the United States. Such shipments will be cut off as a result of the war.

Export sales of American equipment thus far this year are up materially over the same period last year—the percentage increase being estimated at about 25 percent. It appears likely that there will be a sharp pick-up in such foreign shipments, South America to be the point where the stimulation will first come. However it is likely that increases will come from all over the world except from Poland.

A general stimulation of domestic sales also is expected. This should come as a result of a picking up in domestic demand for crude brought about by increased industrial activity, and also because of an anticipated increase in crude and refined exports brought about by the war.

Due to the transport situation a considerable number of foreign orders have been delayed in shipping but it is expected that this will be straightened out within the next month.



Bahrein Island, located on the east coast of Arabia in the Persian Gulf, is one of the world's more important relatively new petroleum reserves. Although controlled by strictly American interests, warring nations may offer to buy considerable of the island's production, both crude and refined products. The map presented herewith, incidentally, was prepared in connection with commemoration festivities presided over by His Highness Shaikh Sir Hamad Bin Isa Al-Khalifah to celebrate development of the oil industry in the sheikdom of Bahrein.

and gas producing horizons be made at all tests drilled in the province. "The operator of every well which is being drilled for petroleum or natural gas shall immediately upon encountering a geological horizon or formation from which production of petroleum or natural gas may be anticipated, unless otherwise ordered by the board, core and adequately test such horizon or formation," the order read. "All information so obtained shall be forwarded to the board by the most expeditious method and no further drilling shall be conducted until so instructed by the board."

To load first tanker at Guanta, Venezuela, soon

Mene Grande Oil Company plans to load the first tanker at the new Guanta, Venezuela, terminal about October 1, according to W. T. Wallace, executive of Gulf Oil Corporation, parent company, at Pittsburgh.

Oil has been flowing by gravity through the 100-mile, 16-inch line from Mene Grande's field at Oficina to Guanta since August 9. This line will serve as a carrier also for some of the crude produced by Standard Oil Company of Venezuela and Shell interests in eastern Venezuela.

Buenrostro announces 30 tests for Poza Rica field

Poza Rica, richest oil field in Mexico which has been practically dormant from a drilling standpoint since expropriation of the oil industry there March 18, 1938, will become active again, it was seen as a result of a statement issued by Efrain Buenrostro, secretary of the Department of National Economy.

Poza Rica, which is credited with only five completions in 1½ years, is slated for a 30-well program immediately, the announcement declared. Resumption of activity there may lead to drilling in other Mexican fields which were producing profitably under private operation before President Cardenas took over the oil industry.

Explanation of the sudden announcement to resume activity at Poza Rica on a scale commensurate with that necessary to maintain production at old time levels may be found in Buenrostro's official statement: "Mexico's entire petroleum production has been sold abroad save for that which has been reserved for the necessities of our country. As a consequence, Mexico will not be able to sell another drop of oil for some months."

In the above connection, a reported deal whereby W. R. Davis of New York was supposed to have disposed of about $20,000,000 worth of Mexican oil to European nations during 1939 was said to have been about half carried out on September 1.

MEN IN THE INDUSTRY'S NEWS

W. R. FINNEY, president of Oklahoma Pipe Line Company, Tulsa, will be transferred to the New York offices of Standard Oil Company of New Jersey, October 1. During the past three years, Finney has handled the operation of the Oklahoma Pipe Line Company, Ajax Pipe Line Company and acted in an advisory capacity for the pipe line department of the Standard Oil Company of Louisiana. In his new capacity he will continue general supervision of the pipe line work and in addition co-ordinate Carter Oil Company and Standard Oil Company of Louisiana producing units with the general offices in New York. This is another promotion for Finney after 25 years of general experience with gas and electric plants and in pipe line and production work in the United States, Mexico and Venezuela.

Paul Griffin, vice president, will take over supervision of Oklahoma Pipe Line Company and will be assisted by Bruce Ramsey, general superintendent, and F. E. Warterfield, Jr., chief engineer.

B. F. NYSEYANDER, president of the Montecito Corporation, Midland, Texas, suffered a sprained back when the plane in which he was traveling with a pilot from Shreveport, Louisiana, to Evansville, Indiana, nosed over in a forced landing 12 miles southwest of Cannelton. He was taken to a hospital at Evansville. The pilot, George Christopherson, Amarillo, Texas, was not hurt.

G. H. BLANKENSHIP, Centralia operator and vice president of the Independent Oil Producers' Association of Illinois, told a Centralia civic organization last week that a campaign for conservation regulation would be started shortly in the Basin.

ALFRED HURLBURT, vice president of Republic Natural Gas Company, Dallas, Texas, is vacationing in Florida.

Houston geologists will hold first fall meeting

The Houston Geological Society, composed of 330 active members, will hold its first fall meeting Thursday, September 14, at noon above Kelley's restaurant on Texas Avenue.

F. W. Rolshausen, of Humble Oil & Refining Company, will speak on the subject, "A Few Common Fossil Horizons of the Gulf Coast."

C. D. Lockwood will give a summary of happenings in the past 2½ months in the oil industry that were of particular interest to geologists.

The Houston Geological Society did not meet in July and August.

Present officers of the organization are as follows: Perry Olcott, Humble Oil & Refining Company, president; Russell A. Weingartner, Stanolind Oil & Gas Company, vice president; Carleton D. Speed, Jr., Speed Oil Company, secretary-treasurer.

The advisory committee is composed of Olin G. Bell, Humble Oil & Refining Company; Hugh T. Richardson, Standard Oil Company of Texas; and William F. Calahan, Union Producing Company.

DR. M. BENNETT BLACKLER, who until his recent resignation was a director in the Egyptian government's department of petroleum, has had conferred upon him the Order of the Nile by King Farouk.

H. H. HENRY, formerly chief inspector for Mene Grande Oil Company on the 16-inch line being built from Oficina to Guanta, Venezuela, 100 miles, has returned to the United States and will have headquarters at Overton, Texas, with Gulf Oil Corporation.

R. I. DICKEY, new member of Forest Development Corporation, will return to Midland, Texas, where he was formerly with Standolind Oil & Gas Company.

ED MORGAN, Sun Oil Company scout, has been moved from the Forest City basin to the Illinois Basin.

C. M. HAMILTON, of New York, vice president of York State Oil Company, was a recent business visitor in Wichita, and other Kansas oil centers.

HAROLD C. BISHOP, who is interested in development of a concession in the Dominican Republic, has returned to New York from Haiti.

GEORGE REID, executive secretary of the Gulf Coast Refiners Association, Houston, has been elected to the American Petroleum Institute's central committee on public relations.

W. L. CHILDS, vice president and general manager of Reed Roller Bit Company, Houston, Texas, has been elected to the central committee on public relations maintained by the A.P.I.

AMON G. CARTER, Fort Worth oil operator and publisher, was guest of honor and leader of the parade held at the Midland, Texas, rodeo last week. Carter was given a saddle nad trappings by Fort Worth citizens.

ARTHUR F. CORWIN, vice president and director of Socony-Vacuum Oil Co., Inc., was guest of honor at a dinner signalizing his completion of 40 years of service with the company.

W. A. SHERMAN, chief clerk of The Texas Company's production department at Houston, has returned from a vacation trip to Rochester, Minnesota.

MAURICE J. WILSON, Baton Rouge, Louisiana, has been appointed secretary of the Louisiana Petroleum Industries Committee.

E. B. SHAWVER, president of the Kansas Independent Oil and Gas Association, has returned to Wichita from a vacation on his Colorado ranch.

JOHN G. LANE, L. R. Eddy and John Kraker have incorporated Lake Refining Company under Illinois laws. Headquarters are at 122A North Locust Street, Centralia.

TONY FALLETTI, scout in the Kansas district for W. C. McBride, Inc., has been transferred to Tulsa.

J. E. GALLEY, formerly of Tulsa, has been assigned to the Kansas geological staff of Shell Oil Company. He will make his headquarters in Wichita.

DIED:

NOEL LAWSON, 50, president of the Tribal Oil Company, Big Spring, Texas, was killed September 1 near Stanton, Texas, when struck by an auto. He had halted his car on the roadside because of tire trouble. He was a native of St. Joseph, Missouri, and had operated in West Texas for 12 years.

L. G. PRIEST, 47, Texas independent operator the past 15 years, died September 5 in a Fort Worth hospital after a long illness. He was a native of Fort Worth.

J. B. PATERSON, 73, Alberta oil development pioneer, died in Calgary August 17.

Shell sells Arkansas City refining plant

Brown-Strauss Corporation, Kansas City Missouri, has completed negotiations for Shell Oil Company's Arkansas City, Kansas, refinery. This plant has been closed down for some months. Following the transaction at an undisclosed price, Brown-Strauss Corporation immediately began dismantling of equipment and machinery for liquidation.

The purchase of the refinery includes 135 gasoline tanks of from 15,000 barrels capacity down, yard pipe, coke loading equipment, boilers, pumps, engines of various horsepower, and miscellaneous refinery equipment. A portion of the material was not included in the disposal by Shell Petroleum Corporation, and this will be shipped by the firm to its refineries at Woodriver and Houston. Also excepted from the sale was the site, club house and staff houses.

Tank bottom oil regulations changed by Texas board

The Texas Railroad Commission has revised its rule governing the processing of tank bottoms in all Texas fields. Under the new order, operators of treating plants may obtain a temporary permit, but before this is made permanent, a hearing on the application must be held.

The commission requires that these tank bottoms be charged back against the well allowable. In the past, the commission has had considerable difficulty in preventing operators from running "hot" oil under the guise of tank bottoms, and the new order is expected to correct this defect.

THE WEEK'S NEWS SUMMARIZED

Proration

Additional agitation for proration of Illinois' mounting production, which has increased from 5000 barrels daily to more than 300,000 barrels per day during the past 2½ years, developed last week as the Independent Oil Producers' Association of Illinois asked Governor Henry Horner to call a special legislative session to enact necessary measures. Simultaneously, Lieut. Governor John Stelle, until very recently against all forms of proration, presented a four-fold program he stated would regulate the state's rapidly expanding oil industry. Stelle suggested minimum production allowable quotas be fixed, that additional well output be permitted where market demand existed, and that common purchaser provisions be enacted to insure ratable taking.

Meanwhile, Secretary of the Interior Harold L. Ickes continued his attack on conditions in Illinois, declaring that operators "do not seem to have any consideration for the effect on other states and the national economy."

A most important proration hearing is scheduled to take place in Austin on Monday, September 11, when the Texas Railroad Commission will propose a new plan for prorating the gigantic East Texas field. A federal court decision has held the present method confiscatory because it was based purely upon number of wells, and ordered oil in place and sand conditions be considered. To achieve this plan, the commission will propose a well potential plan that will incorporate sand thickness, average field potential and bottom-hole pressures. This would mean increasing the allowable of the field considerably, about 100,000 barrels daily. Since the commission a week ago announced it proposed to prevent any increase in the state's total output, this meant other regions would be curbed to take care of this amount. However, it is now indicated that the commission has received so many protests to the Gulf Coast, South Texas and West Texas fields having their allowables reduced further, that it may decide to permit the state's September output to increase. The European war situation, which is causing many inquiries for motor fuel to be made in Houston and elsewhere that cannot be filled, may be a means out of the predicament the commission is in.

Operators in practically all major producing states have been confronted with a problem of steadily diminishing allowables, as new completions have been given their prorata share of the market. California, however, has been enjoying much higher per well average output than other states. But apparently, the situation in the West Coast state has reached the point where allowables per well will diminish rapidly from now on. Last week, the third consecutive monthly reduction in allowables was announced, and the uniform proration allocation table was adjusted downward also.

Markets

Markets for crude oil and refined products have been quick to grow strong following the declaration of war, although the hostilities may be getting some of the credit that rightfully belongs to the recent Mid-Continent oil field shutdowns.

Nevertheless, the buoying effect of the new war was unmistakably in evidence last week, as oil products essential in war were particularly in strong demand. Aviation gasoline could not be bought late last week, it was reported, and lubricants for export were in great demand. Similarly, the markets for fuel oil were exceptionally strong.

Whereas producers were blue less than a month ago when a general reduction of crude prices in the Mid-Continent was barely averted by the oil field shutdowns, they were beginning last week to talk of possible increases in crude postings. It was recognized, however, that the hopes of higher crude prices were perhaps premature, and that later developments would have to determine the future prices of crude.

Stocks

Crude oil inventories hit a 17¼-year low when they dropped approximately 15,000,000 barrels in the week ended August 26, because of the Mid-Continent shutdowns, after having declined by the large amount of about 5,000,000 barrels in the previous week. The total on hand August 26 was approximately 247,000,000 barrels. Crude stocks are apparently about as low as operating requirements will permit.

Gasoline stocks came down only slightly in the week ended September 2, despite reduced refinery runs.

For domestic requirements, the gasoline inventory is larger than necessary. But in view of the war requirements of Europe and probable large exports in the months ahead, the stocks may not be too large.

News Section Index

General News 70-78

Proration Picture 70
Market Situation 74
Oil in the Courts 73
Oil at the Capitols 74
Crude Oil Production 78

World Developments 64

Field Development News 81-107

Arkansas 99
Mississippi 100
California 104
New Mexico 103
East Texas 92
North Louisiana 74
Eastern States 56-59
North Texas 88
Illinois 84
Oklahoma 82
Indiana 86
Panhandle Texas 88
Kansas 83
Rocky Mountains 101
Kentucky 86
Southwest Texas 94
Louisiana Coast 97
Texas Gulf Coast 96
Michigan 105
West Texas 90
Wildcat Development Report 106

Proration Picture

Agitation for Illinois proration spreads . . . War may permit East Texas output increase without cuts in other areas . . . California well quotas slashed

Would call Illinois session to study oil legislation

The Independent Oil Producers' Association of Illinois last week asked Governor Henry Horner to call a special session of the legislature to consider "necessary" oil legislation. Simultaneously, Lieut. Gov. John Stelle, formerly foremost of opponents of control legislation who a week ago reversed his stand, presented a four-fold program he said would regulate the state's growing industry.

"Since early last spring, the Independent Oil Producers' Association of Illinois has been advocating an oil conservation law for this state," the association declared in a telegram to the governor. "We have believed fair and reasonable legislation of this nature would eliminate waste of one of the state's great natural resources; stabilize an important industry and contribute materially to the welfare and economic recovery of the state.

"It is gratifying to know that such legislation now has approval of an overwhelming majority of Illinois oil producers," the association added. "In view of the critical situation existing at this time in the oil market, the threat of possible federal control, if waste is not stopped, and the unanimity of opinion now prevalent among producers of oil in Illinois, we urgently request that the legislature be called into special session at some early date for the purpose of considering necessary oil legislation."

The lieutenant governor offered a program based upon the following propositions:

1. A nonpartisan commission of Illinois citizens. 2. Minimum production allowables fixed by statute to the end that those engaged in the industry may receive a reasonable speedy return on their drilling investment. 3. Production allowables above the base allowable, fixed by the commission upon pool demand based upon market requirements from that pool. 4. Common purchaser provision insuring the ratable taking of all production from whatever source within the pool.

"It would seem that under the circumstances as the same exist today," Stelle said, "that if those who advocate a regulatory program for Illinois, will signify their approval of a conservation program based upon the fundamentals mentioned above, together with an assurance that the enactment of such a program will stabilize the oil industry and will insure to the landowners, royalty owners and business men the greatest possible return from this source, then we may have arrived at a common ground for the solution of the problem."

Ickes says Illinois has no regard for other states

Secretary of the Interior Harold L. Ickes last week renewed his attack against the oil situation in Illinois, praising Governor Horner for his "perfectly splendid" stand on conservation, but charging that Illinois is a "wildcat" state so far as oil is concerned.

Discussing the situation at a press conference September 7, the secretary said the operators "do not seem to have any consideration for the effect on other states and the national economy as a whole."

Although Secretary Ickes has been vociferous in his denunciation of the failure of Illinois to operate on a conservation basis, it was acknowledged in Washington that there is nothing he can do to correct the situation in the absence of legislation.

In oil circles, his continued criticism of conditions in Illinois is seen as an effort to impress upon the country the grave need for federal control along the lines of the legislation introduced in Congress last session by Representative Cole of Maryland.

Texas may increase September allowable

Members of the Texas Railroad Commission Friday began to pull in their horns on a statement issued August 30 in which they indicated that after the statewide hearing on September 11 East Texas would be raised 110,000 barrels daily and the total state allowable cut 15 percent below the U. S. Bureau of Mines allocation.

Commissioner Thompson, vacationing in New Mexico, phoned that he was opposed to increasing the allowable for East Texas above a figure that would allow production reducing bottom-hole pressure unduly. Commissioner Sadler immediately countered with a statement recommending an increase of 115,000 barrels for East Texas and leaving the rest of the state as it is now.

Commissioner Lon A. Smith said he thought East Texas did not need as large an increase as was contemplated originally, nor did he think the remainder of the state need be cut as drastically as the statement of August 30 indicated.

"All the testimony," Thompson said "which we have heard through the years in the East Texas field is to the effect that only a certain quantity of fluid can be produced without unduly drawing down the bottom-hole pressure, causing intrusion of water, trapping of oil and causing preventable waste.

"Therefore, the first consideration of the commission must be to protect the field as a whole. None can object to saving the whole field and enforcing such rules and regulations that will cause the greatest possible recovery of the field. To do otherwise would be to injure every well in the field and do injustice to all owners.

"Thus, the commission must first of all decide upon the total fluid outlet according to the evidence before us. We have in the past possibly been wrong in giving too much oil to the small tracts. We were doing what we thought was the proper way to allocate under the law as we understood it in its application to the very difficult situation presented in the East Texas field. The ownerships were varied and numerous. The tracts were small, several towns were located in the oil producing area; however, the courts have spoken and we must write a valid order in keeping with the court's interpretation of the law. This means we must keep the field within the demonstrated top allowable and that we must give due consideration to acreage and position on structure in every case in addition to past consideration of only ability to produce.

"We should be more careful to preserve the pressure because our margins are much narrower than in the past. We are closer to the danger point than we ever have been. Some wells go on the pump at 1100 pounds. We do not have as much leeway as we did.

"Therefore we must be very cautious about increasing the top allowable."

War Demand Expected

"I am against cutting the state's present allowable below the Bureau of Mines' estimate," Commissioner Jerry Sadler stated, "because of present market and economic conditions. As a matter of fact, I believe that the railroad commission should raise the allowable sufficiently to enable Texas producers to regain markets which they have lost during the past few months.

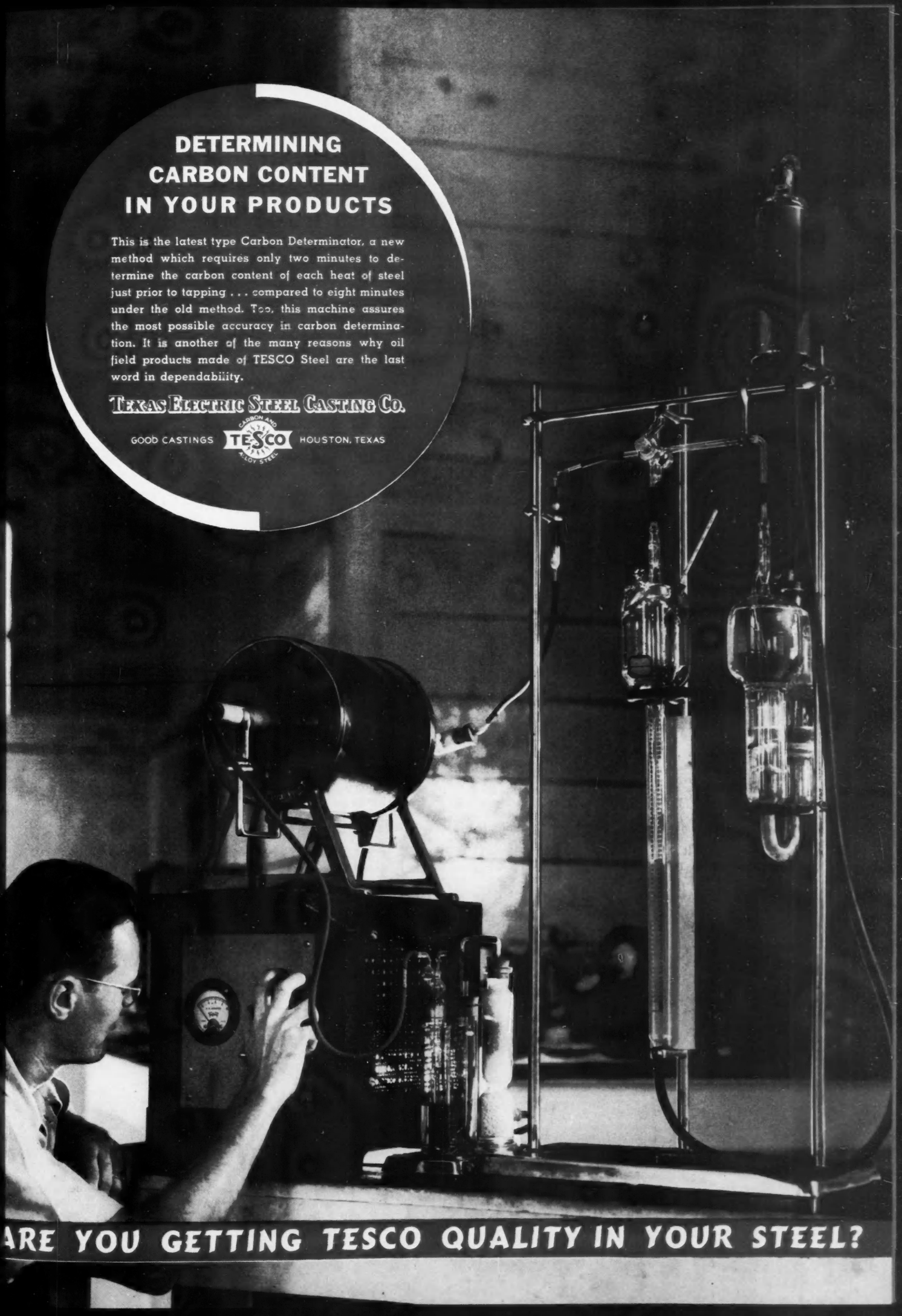
"In order to comply with the federal court's order to increase production in East Texas as a result of the Rowan and Nichols and Humble cases, it will be necessary for the commission to approve increases for East Texas. This can be answered by hiking the allowable approximately 115,000 barrels per day for a 7-day production week. This is a very small figure.

"In short, I fail to see the necessity of cutting the allowable for the state's other oil fields to make up for the infinitesimally small increase which we are forced to give East Texas. Testimony which we have taken at the various hearings in the past two months will bear me out in this contention.

"In view of the present war crisis in Europe, I am today calling upon the Bureau of Mines to issue a supplemental estimate on September demand. This information, I am sure, will reveal an increased demand for Texas crude.

"Many Texas producers now have contracts to supply foreign nations with crude. * * * I believe that we should continue to fulfill these.

"The days are numbered when we will be asked to furnish fuel for warring instruments of death and destruction, and we should make our plans right now to take care of this emergency. The basis for wholehearted cooperation in the state's oil industry has been laid, and we must continue to strive toward the end of maintaining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that attitude for the protection of every person either directly or indirectly concerned."

Commission announces proposed East Texas plan

Lon A. Smith, chairman of the Texas Railroad Commission revealed last week the formula which the commission is considering for the East Texas field. It is to be incorporated in an order to be issued after the statewide hearing on September 11.

Smith called on Dr. F. V. L. Patten, chief petroleum engineer for the commission, to explain the plan to newsmen. He said that the Hudnall formula, set out below, was the only one on which commission engineers had prepared any data.

Acre Feet of Sand on Lease x Average Potential x Lease Bottom Hole Pressure

Acre Feet of Sand in Field x Average Potential of All Wells x Average Bottom Hole Pressure

Smith pointed out that the commission had not settled definitely on any plan, but it will be recalled that this program which was presented by J. S. Hudnall at an East Texas hearing held in Austin on August 15, is the only complete and definite formula offered. Hudnall recommended that the commission grant 20 barrels to every well in the East Texas field capable of making that amount, and that the formula be applied above that figure to the better wells in the field.

Whether the commission will grant the 20 barrels as it has done invariably in the past, Patten could not say, but in the event it follows the established policy, he said that 515,000 barrels would be required for marginal oil, and Smith thought that 140,000 barrels more might well be required to be distributed according to the formula. This would make a daily average allowable of approximately 468,000 barrels on the basis of a 5-day week. The field is now producing about 380,000 barrels average, which indicated an average increase of about 88,000 barrels for the field.

Patten said that some 30 commission employees have been engaged in determining the data upon which the allowable for each lease and each well would be based. He said that the commission would rely on its own sand thickness, potential and pressure data.

Undoubtedly, the presentation of such a formula at the hearing will bring a storm of protest from two groups. East Texas holders of large leases less densely drilled will object to the inclusion of a potential factor, and to an increase in the total daily allowable for the field. Producers outside the field will unquestionably object to any increase in East Texas at a time when the commission has announced that it plans to cut the state 15 percent below the allowable recommended by the United States Bureau of Mines.

To oppose changes in East Texas proration methods

Opposition to the scheduled change in the method of apportioning production in the East Texas field from a well-potential basis for a plant that will incorporate sand thickness, average per-well potential and bottom-hole pressure in determining the allowable of non-marginal leases was evident among some operators on the eve of the commission hearing to be staged at Austin September 11. The failure of the three-factor formula to penalize densely drilled leases in the fairway section of the field and to discourage additional drilling on the small tracts brought forth the greatest volume of criticism.

Opponents to the new plan that has been drafted by the commission's engineering staff contend that all closely drilled tracts will retain a minimum quota of 20 barrels base allowable daily as in the past, while a substantial number will gain higher allowables because of having a maximum of the 3 factors.

An official of the Rowan-Nichols Oil Company, first concern to enjoin the commission through federal court suit against the well-potential plan, has protested the use of the new formula. The company resorted to court action in order to prevent an offset well on a fraction of an acre tract from producing an amount of oil equal to that of moderately spaced wells. The well that brought on the court fight has a rated potential of 960 barrels per hour, with a base allowable of 22.27 barrels daily. It drilled 20 feet into the sand. However, its rated sand thickness will be arrived at on a contour map basis.

Louisiana proration law attack may doom probe

Louisiana's hot oil investigation that caused such a furore of excitement last month appeared headed for rocks last week, when George Lilly, Houston operator with interests in several fields, filed suit in federal district court at New Orleans claiming discrimination against him in the matter of proration of the Eola field, Avoyelles Parish. Four causes for action were named in the briefs filed by Lilly's attorneys, one being the allegation that in addition to discrimination, the Louisiana Conservation Department's proration laws are unconstitutional. Lilly said if matter of discrimination is not settled to give him 400 barrels allowable from his Eola well, he will contest on latter action.

Judge Wayne G. Borah, now hearing other cases involving Louisiana scandals, asked Judge Ben C. Dawkins of Shreveport to pass on Lilly's application for restraining order to prevent Conservation Commissioner Ernest Clements from setting allowable.

Thursday Judge Dawkins set a hearing for a three-judge court to convene in New Orleans September 18 to pass on the case.

O. John Rogge, special assistant to Attorney General Frank Murphy, commenting on the suit, said: "If the state conservation laws are thrown out as they have been in Texas, then our case against violators of the Connally Act will be cancelled."

The brief filed says that Lilly was not granted a permit to drill a 23-acre tract, in spite of the fact that leases and additional holdings would become null and void unles drilling operations started on a given date. Lilly admits he drilled the well without a permit, "in order to protect my investments." While the permit was being delayed, according to the petition, the department of conservation, then under the jurisdiction of William G. Rankin, granted permit to W. C. Feazell, former state legislator, to drill an offset 17-acre tract, and included some of the state's land in Bayou Beouf in the survey to bring the acreage to that total.

In addition, when the two wells were completed the Feazell well was allowed 190 barrels a day out of a 500-barrel potential, while the Lilly well was given a 61-barrel daily allowable out of a 1000-barrel potential. The petition claims the conservation department officials made the gauges on both wells.

When Lilly protested the allowable, he was cut back to 29 barrels a day, while Feazell was not.

Attorneys for Lilly include John Land, Jr., former clerk of the State Supreme Court, Ed Court, Ed Heath of New Orleans and Walter P. Baurer of Houston, who claim the suits are based on similar actions in Texas' famed Rowan and Nichols case and Humble Oil & Refining Company's case now in the courts.

New wells bring lower allocations to California

The problem of taking care of newly completed wells, which confronts all the major producing states practicing conservation, has become so acute in California it has been necessary to alter the allocation formula.

J. R. Pemberton, oil umpire for the

Derivation of California's Production Quota for July, August and September, 1939

New Production (Additions)				Subtractions from Old Wells				Net Allotment Change B/D	State Allotment	
				Decline Suspensions & Abandonments B/D	Allocation Formula Changes		Total Deduction B/D			
Completions for Month of	No.*	Potential* B/D	Allotment†* B/D		Intermediate Wells B/D	Top Wells B/D			B/D	For Month of
.....	.....	.....	+	.....	.....	.....	.....	.....	588,201	June
June....	96	91,149	13,451	6,503	.....	.....	6,503	+ 6,948	595,149	July
July.....	100	110,031	15,669	8,225	1,950	4,370	14,545	+ 1,124	596,273	August
August‡.	114	131,800	17,792	8,000	2,845	4,920	15,765	+ 2,027	598,300	September
Total 3 Months	310	332,980	46,912	22,728	4,795	9,290	36,813	+10,099	.....	.....

* New and recompleted wells. † Reconditioned, resumed and corrected. ‡ Preliminary.

Central Committee of California Oil Producers, in revealing the allocation formula in use for some months had been altered, stated that suspensions, abandonment of wells and decline in potentials of various wells accounted for approximately 8000 barrels of relinquished allotment, but that the constantly increasing influx of new wells which required an allotment exceeded this decrease.

A table accompanying Pemberton's announcement showed that during the three months of June, July and August this year the decline in allowables because of suspensions and abandonments amounted to 22,728 barrels daily. This seems unusually high, but even with this trend the completion of 310 wells with a combined daily potential of 332,980 barrels required the allotment of 46,912 barrels daily. Since the state's allowable was increased 10,099 barrels during the period, it was necessary to readjust allocations to take care of only 14,085 barrels of this 24,184-barrel gain between suspensions and new completions.

However, even this reduction was sizeable. In view of the fact that it was not desired to raise the state's quota above 598,300 barrels for September, it was necessary to reduce the allotments to all top wells and intermediate wells. A total of 9290 barrels were deducted from the top wells and 4795 barrels from the intermediate wells. Consequently, from June to September, 100-barrel wells of 3000 feet in depth have lost .9 of a barrel; 100-barrel wells of 6000 feet have lost .6 of a barrel; 200-barrel wells of 3000 feet depth have lost 1.9 barrels daily; and 200-barrel wells of 6000-feet depth have lost 1.6 barrels per day.

The tables reveal that the problem is becoming more acute. For instance the 96 new wells completed in June jumped to 114 in August, while potentials increased from 91,149 to 131,800 barrels. On this basis production allotments rose from 13,451 barrels in June to 17,792 barrels in August.

Therefore, for September the committee rearranged the uniform allocation table. By reducing allotments to top wells by 10 barrels, 4920 barrels of the increase were obtained, and intermediate wells lost 2845 barrels of allotment. The remainder of 2027 barrels was added to the state's August quota. This was the third consecutive month in which top wells have lost 10 barrels, and such allocations now stand at 230 barrels.

These figures are set forth in one of the accompanying tables, as also are the data on the state's new uniform allocation table.

California Allocation Formula Changes

Potential	3,000 Foot			6,000 Foot		
	June & July	August	September	June & July	August	September
50	31.9	31.8	31.6	48.4	48.4	48.4
100	46.5	46.1	45.6	66.0	65.8	65.4
200	70.2	69.4	68.3	91.2	90.5	89.6
400	110.	108.	106.	132.	130.	128.
800	176.	173.	169.	199.	196.	192.
Top Well	250.	240.	230.	250.	240.	230.
Potential for Top Well	1,315	1,275	1,245	1,145	1,105	1,068

California Allocation Table, Effective September 1, 1939

Potential	ALLOTMENT ACCORDING TO DEPTH										
	0-2000′	3000′	4000′	5000′	6000′	7000′	8000′	9000′	10000′	11000′	12000′
5	5*	5*	5*	5*	5*	5*	5*	5*	5*	5*	5*
10	10*	10*	10*	10*	10*	10*	10*	10*	10*	10*	10*
11	11*	11*	11*	11*	11*	11*	11*	11*	11*	11*	11*
15	13.8	15*	15*	15*	15*	15*	15*	15*	15*	15*	15*
18	15.3	18*	18*	18*	18*	18*	18*	18*	18*	18*	18*
20	16.2	19.7	20*	20*	20*	20*	20*	20*	20*	20*	20*
25	18.3	22.3	25*	25*	25*	25*	25*	25*	25*	25*	25*
26	18.7	22.8	26*	26*	26*	26*	26*	26*	26*	26*	26*
30	20.2	24.5	28.8	30*	30*	30*	30*	30*	30*	30*	30*
35	22.0	26.4	31.2	35*	35*	35*	35*	35*	35*	35*	35*
40	23.6	28.3	33.3	38.4	40*	40*	40*	40*	40*	40*	40*
45	25	30.0	35.2	40.7	45*	45*	45*	45*	45*	45*	45*
50	27	32	37.0	42.7	48.4	50*	50*	50*	50*	50*	50*
56	29	33	39.0	44.9	51.1	56*	56*	56*	56*	56*	56*
60	30	35	40	46.3	52.7	58.8	60*	60*	60*	60*	60*
68	32	37	43	48.9	55.6	62.5	68*	68*	68*	68*	68*
70	33	38	43	49.5	56.3	63.3	69.7	70*	70*	70*	70*
80	35	40	46	53	59.5	67.0	74.5	80*	80*	80*	80*
81	36	41	46	53	60	67.3	74.9	81*	81*	81*	81*
90	38	43	49	55	63	70.2	78.3	86.2	90*	90*	90*
95	39	44	50	57	64	72	80.0	88.3	95*	95*	95*
100	40	46	52	58	65	73	82	90.2	98.4	100*	100*
110	43	48	54	61	68	76	85	93.6	102.7	110*	110*
120	45	51	57	63	71	79	88	97	106.3	115.7	120*
126	47	52	58	65	72	81	89	99	108.3	118.1	126*
130	48	53	59	66	73	82	90	100	110	119.5	128.8
140	50	55	61	68	76	84	93	103	113	123.0	133.3
150	52	58	64	71	78	87	96	105	115	126	137.0
160	54	60	66	73	81	89	98	108	118	129	140
170	56	62	68	75	83	91	101	110	121	132	143
180	59	64	70	77	85	94	103	113	123	135	146
190	61	66	73	80	87	96	105	115	126	137	149
200	63	68	75	82	90	98	108	118	128	140	152
210	65	70	77	84	92	100	110	120	131	142	154
220	67	72	79	86	94	103	112	122	133	144	157
230	69	74	81	88	96	105	114	124	135	147	159
240	71	76	83	90	98	107	116	126	137	149	161
250	73	78	85	92	100	109	118	129	140	151	164
260	75	80	87	94	102	111	120	131	142	154	166
270	77	82	89	96	104	113	122	133	144	156	168
280	79	84	91	98	106	115	124	135	146	158	170
290	80	86	93	100	108	117	126	137	148	160	173
300	82	88	94	102	110	119	128	139	150	162	175
320	86	92	98	106	114	123	132	143	154	166	179
340	90	95	102	109	117	126	136	147	158	170	183
360	93	99	106	113	121	130	140	150	162	174	187
380	97	102	109	116	125	134	144	154	166	178	191
400	100	106	113	120	128	137	147	158	169	181	194
420	104	109	116	123	132	141	151	161	173	185	198
440	107	113	119	127	135	144	154	165	176	189	202
460	110	116	123	130	139	148	158	168	180	192	206
480	114	120	126	134	142	151	161	172	183	196	209
500	117	123	129	137	145	155	165	175	187	199	213
520	120	126	133	140	149	158	168	179	190	203	216
540	123	129	136	144	152	161	171	182	194	206	219
560	127	132	139	147	155	164	174	185	197	210	223
580	130	136	142	150	158	168	178	189	200	213	226
603	133	139	146	154	162	171	181	192	204	217	230
687	146	152	159	167	175	184	195	206	217	230	.....
770	159	164	171	179	188	197	207	218	230	.....	.....
850	170	176	183	191	199	209	219	230	.....	.....	.....
928	181	187	194	202	210	220	230	.....	.....	.....	.....
1,001	191	197	204	212	221	230	.....	.....	.....	.....	.....
1,070	201	207	214	221	230	.....	.....	.....	.....	.....	.....
1,135	209	215	222	230	.....	.....	.....	.....	.....	.....	.....
1,193	217	223	230	.....	.....	.....	.....	.....	.....	.....	.....
1,247	224	230	.....	.....	.....	.....	.....	.....	.....	.....	.....
1,294	230	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

* Same as Potential.

Oil in Courts

Grand jury investigating "price fixing" dismissed

The federal grand jury summoned at Danville, Illinois, June 6 to determine whether major oil companies operating in 10 middle western states had fixed and maintained artificial gasoline prices reported last week that it had found "no cause for action" and was summarily dismissed.

Companies involved, for the most part, were those covered in the Madison indictments of three years ago; Thurman Arnold, assistant attorney general, announcing when the investigating body was summoned that there were indications that "many practices complained of in indictments returned at Madison, Wisconsin, in 1936 have not been wholly abandoned in the oil industry." He added that "there is reason to believe gasoline price levels in this area have continued to a large extent to be artificially maintained and many terms under which gasoline jobbers are permitted to do business with major companies remain rigid and restricted."

Arnold explained also that the department wanted evidence from defendants who entered pleas of "nolo contendere" in the second Madison case involving jobber contracts. He said that the Danville grand jury would have the power to compel witnesses to disclose all the facts within their knowledge since pleas had been entered and fines paid, whereas the Madison grand jury could not do so.

The Danville grand jury had recessed June 23 to August 31, returning its report a few days after reconvening.

Market Situation

Higher crude price talk commences as European war booms demand for gasoline and lubricants, that are not available due to recent shutdown

Markets are made strong by war and shutdowns

With the new war added to the recent Mid-Continent oil field shutdowns as a buoying influence, the industry's markets have become strongest for many months.

Whereas crude prices were temporarily marked down at mid-August, before being restored during the shutdowns, they now are remarkably strong; and some producers are talking up increases of postings, although it does not appear likely that purchasers actually will consider raising prices at this juncture.

Uncertainties Exist

It is generally recognized that numerous factors will affect the oil industry's markets henceforth, some within the industry and some having to do primarily with the war. There is danger that restrictions on crude production may be prematurely loosened, before it is definitely determined what effect the hostilities will have on oil demand. Furthermore, there may be for some time, at least, a serious interruption of oil exports to Europe, as indicated by the fact very few tankers have been moving out of Gulf ports since declaration of war, while even for a week or so before hostilities commenced, there was a pronounced dropping off of exports.

Nevertheless, it is generally believed that the shock of the war's beginning will wear off within a few months at the longest and that exports then will be large.

Aviation Gasoline

Even as early as last week there developed a stronger demand for aviation gasoline, motor fuel and for lubricants, presumably because of the war situation; although another influence, undoubtedly, was the scarcity that arose from the Mid-Continent shutdowns. It is difficult at present to distinguish between the effects of the war and those of the shutdowns.

Even before the war began, the market for aviation gasoline was comparatively good, as supplies have been consistently scarce, with facilities for turning out that product still limited. But after the war commenced, prices were pushed upward.

Lubricants in Demand

Bright stocks and neutral oils, used in blending lubricants, have been in particularly strong demand since the war started, although they were firm even earlier, because of the Mid-Continent shutdowns. In the Mid-Continent last week some companies had advanced prices of bright stocks as much as 1½ cents a gallon and those of neutral oils 1 cent, while similar advances had occurred on the Gulf Coast.

Prices of gasoline last week were not materially changed from the previous week, but the substantial gains since commencement of the Mid-Continent shutdowns were easily held.

Similarly, prices of kerosene and of fuel oils were largely unchanged, but demand was good and the markets were firm.

Stocks of both the light and heavy fuel oils are relatively light, and continued strong markets for those oils appear assured.

Crude Price Raised

Some encouragement was given in the crude market when a 10-cent increase in the price in a North Louisiana field occurred, after a major purchaser entered as a buyer in competition with two independent purchasers.

Standard Oil Company of Louisiana entered the Shreveport field as a purchaser, announcing a price of $1.05 per barrel for crude of 40 gravity and above, the regular price for this grade of oil in other North Louisiana and Arkansas districts where this company is a purchaser. Previously two independent companies, the only purchasers in the Shreveport field, had been paying 95 cents per barrel, but both boosted the price September 7 to $1.05 for 40 and above. Standard of Louisiana will lay its own gathering line to the field, with connections at its Moore Station tank farm near Shreveport, whence the oil will be sent through its trunk line to Baton Rouge.

Caddo Crude Purchasing Company on September 8 hiked the price of Lisbon, North Louisiana, crude 5 cents a barrel to a top price of 77 cents for 35 and above, with a 2-cent differential for each degree down to 61 cents. This firm is the main purchaser in Lisbon.

California Crude Cut

Effective September 1, Union Oil Company of California announced a price cut for crude it is purchasing from operators in the Santa Maria Valley oil field. The

Oil at the Capitols

Advocates of federal control for oil see war in Europe as another reason for speeding up action

War in Europe on top of recent experiences of the oil industry may serve to speed up action on legislation giving the federal government control of production, it was held in Washington last week.

Whether the question of oil would come up at the special session of Congress which President Roosevelt may call in the near future to consider neutrality legislation would depend, it is believed, upon whether administration officials, upon study of the matter, felt it to be of pressing importance since, if the session is to meet at an early date, the Cole subcommittee will not have time to make the investigation on which it was planned to base action at the next regular session.

That the present situation was not unforeseen by the National Resources Board in its energy studies is evidenced by its reports, in which it repeatedly pointed out that a definite program for all sources of energy, including oil, should be adopted as a part of the national defense as well as for the conservation of natural resources.

The Navy Department, in seeking to consolidate its holdings in the Naval Petroleum Reserves and in attempting to secure possession of the California off-shore oil fields, stressed the desirability of providing against an emergency.

While, since it is expected there will be a speeding up of activity in this country as a result of war conditions abroad, no recurrence is expected of the recent production strike. Administration officials are said to be rather concerned over the potentialities disclosed by the shutting down of wells in six states.

There is no thought whatever in Washington that there would be any difficulty placed in the way of production in an emergency, but the August shut-down demonstrated the power of the states, which could be exercised as readily in an over-expansion of production as in its contraction.

As viewed by Secretary of the Interior Harold L. Ickes, the shut-down was a price-raising device without application to conservation. If the question of oil legislation comes up, he is expected to be the strongest supporter of federal control.

For many months, administration officials have been working on a program to cushion the shock of war upon our industry, finance, agriculture, shipping and other activities. As yet, the full details of those plans have not been made known, but it is known that there are in government files full plans for the control of industry in case of an emergency, in which control of oil—a basic military necessity in modern warfare—is a major factor.

Whether oil legislation will be a feature of a special session of Congress will, therefore, depend upon several factors, not the least important of which will be any developments occurring in the world situation prior to the opening of the session.

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2,154,851; 2,155,122;
others pending.

following is what the company now is paying per barrel at the well:

Gravity	Cents Per Barrel
14.0 to 14.9	42
15.0 to 15.9	44
16.0 to 16.9	45
17.0 and above	46

Gasoline Prices

U. S. motor gasoline at Oklahoma refineries ranged last week about as follows: 62 octane and below, 4½ to 4¾ cents a gallon; 63 to 66 octane, 4¾ to 5⅛ cents; 67 to 69 octane, 4¾ to 5¼ cents; 70 to 72 octane, 5¼ to 5½ cents.

Corresponding prices in the Chicago market were: 4½ to 4¾ cents, 4⅝ to 4⅞ cents, 4¾ to 5⅛ cents, and 4⅞ to 5⅜ cents.

In East Texas limited quantities of 60-62, 400 end point gasoline were offered around 4½ cents a gallon, as compared with the generally prevailing price of 4¼ cents prior to the Mid-Continent shutdowns.

Having advanced a full cent since the commencement of the shutdowns, natural gasoline, grade 26-70, continued selling in the Mid-Continent markets f.o.b. refineries at 4 cents a gallon, and sales were reported at the same price f.o.b. Breckenridge, Texas.

Kerosene Prices

Kerosene prices f.o.b. Oklahoma refineries ranged from 3½ to 4¼ cents a gallon for the 41-43 water white grade, and from 3⅝ to 4⅝ cents for the 42-44 water white grade; and corresponding prices in the Chicago market were 3⅜ to 4 cents and 3½ to 4¼ cents.

In the Chicago market range oil was priced from 3⅜ to 3⅞ cents a gallon. The No. 1 white oil was priced from 3¼ to 3¾ cents, and No. 1 straw from 3 to 3¼ cents. No. 2 straw was 3⅛ to 3¼ cents. No. 3 oil was 2¾ to 3⅛ cents. No. 5 oils were 65 cents a barrel. The No. 6 oil was quoted at 35 to 45 cents.

Statistics again show effect of shutdowns

The latest weekly statistics of the oil industry further reflected the extraordinary conditions caused by the Mid-Continent oil field shutdowns in the latter half of August.

United States crude oil production in the week ended September 2 increased sharply, the American Petroleum Institute reported, the gain of 592,400 barrels to a daily average of 2,283,200 barrels having reflected resumption of production in the Mid-Continent.

Crude runs to refinery stills came down 100,000 barrels, in contrast, to an average of 3,375,000 barrels daily, because of the shortage of crude occasioned by the oil field closings. Nevertheless, the refinery runs were not far below normal. They were 5.6 percent larger than in the corresponding week last year.

Production of gasoline was curtailed in consequence of the slowing down of plant operations and averaged 1,624,000 barrels daily in the week of September 2, which was 91,000 barrels a day less than in the previous week.

Stocks of finished and unfinished gasoline were cut down only 281,000 barrels during the week, however, despite the curtailed production. The gasoline inventory then totaled 73,194,000 barrels, or 5.2 percent more than the 70,514,000 barrels on hand at the corresponding time last year.

Stocks of gas oil and distillate fuels, used for heating, were augmented about 500,000 barrels in the week ended September 2, and then stood 4.6 percent higher than a year previously. Demand for those oils has been running about 20 percent higher this year than last year.

Inventories of residual fuel oil, used in industry and as fuel for ships and railroads, were reduced about 200,000 barrels, as demand continued relatively large. The stocks of those heavy oils are 6 percent lower than at this time last year, whereas demand is better.

Stocks of crude oil in the United States came down by the extraordinarily large amount of 15,504,000 barrels in the week ended August 26, the Bureau of Mines reported. That large reduction left the storage at the lowest level since May, 1922, or at a 17¼-year low. The withdrawal, caused by the Mid-Continent shutdowns, came after one of about 5,000,000 barrels in the previous week; and was due to be followed by another large reduction in the week ended September 2, which embodied the close of the shutdown period.

Trends of United States Production and Stocks

Figures are from American Petroleum Institute weekly reports, except those on crude stocks, which are from Bureau of Mines weekly reports

	Crude Oil Production (Barrels Daily)	Crude Runs to Stills (Barrels Daily)	Crude Oil Stocks (Barrels)	Gasoline Stocks (Barrels)	FUEL OIL STOCKS	
					Gas Oil & Dist. Fuels	Residual Fuel Oil
1937						
August 28	[5]3,731,450	3,425,000	309,506,000	66,997,000	112,111,000	
September 25	3,666,300	[5]3,455,000	307,974,000	65,620,000	116,472,000	
1938						
March 19	3,433,550	3,080,000	306,380,000	[1]93,192,000	122,067,000	
July 30	3,316,400	3,240,000	288,514,000	76,864,000	27,573,000	116,721,000
August 27	3,388,500	3,255,000	285,029,000	71,754,000	29,747,000	117,179,000
September 24	3,251,150	3,220,000	280,278,000	68,605,000	31,183,000	119,285,000
October 29	3,237,500	3,145,000	275,824,000	67,590,000	33,690,000	120,029,000
November 12	3,243,250	3,180,000	273,394,000	[6]67,551,000	34,175,000	120,491,000
November 26	3,260,900	3,295,000	270,563,000	68,628,000	33,749,000	119,885,000
December 10	3,245,100	3,150,000	[6]269,509,000	68,587,000	32,068,000	118,711,000
December 31	3,201,450	3,115,000	273,024,000	71,695,000	29,082,000	115,741,000
1939						
January 28	3,248,250	3,235,000	271,763,000	77,279,000	26,583,000	112,766,000
February 25	3,328,850	3,185,000	271,758,000	84,597,000	23,419,000	110,252,000
March 25	3,382,350	3,225,000	273,915,000	87,561,000	21,487,000	107,551,000
April 22	3,526,700	3,280,000	277,156,000	[8]87,769,000	21,058,000	105,035,000
April 29	3,568,200	3,405,000	278,440,000	86,794,000	[7]25,844,000	[7]108,409,000
May 6	3,580,900	3,275,000	[2]278,607,000	86,216,000	26,167,000	108,597,000
May 20	3,438,400	3,460,000	277,068,000	84,294,000	26,389,000	109,405,000
May 27	3,585,250	3,405,000	278,289,000	84,152,000	26,992,000	109,386,000
June 10	3,376,950	3,510,000	274,692,000	82,716,000	29,357,000	111,239,000
June 24	3,452,800	3,430,000	272,297,000	81,733,000	30,239,000	111,726,000
July 1	3,463,000	3,480,000	271,567,000	81,102,000	31,230,000	113,388,000
July 8	3,529,800	3,420,000	269,348,000	80,823,000	32,435,000	113,494,000
July 15	3,529,700	3,390,000	268,199,000	79,416,000	33,673,000	114,075,000
July 22	3,583,750	3,395,000	268,447,000	77,960,000	34,366,000	114,035,000
July 29	3,539,100	3,460,000	268,513,000	77,887,000	34,900,000	114,053,000
August 5	[1]3,909,400	3,445,000	268,982,000	76,431,000	35,601,000	114,512,000
August 12	3,550,100	3,460,000	267,536,000	75,859,000	36,239,000	114,309,000
August 19	2,480,550	[1]3,575,000	262,486,000	74,738,000	37,013,000	115,069,000
August 26	[10]1,690,800	3,475,000	[3]246,982,000	73,475,000	37,722,000	116,237,000
September 2, 1939	2,283,200	3,375,000	.....	73,194,000	38,228,000	116,022,000
September 3, 1938	3,349,100	3,195,000	[4]285,029,000	70,514,000	[8]	[9]
Change in past year	—31.8%	+5.6%	—13.3%	+5.2%	+4.6%	—6.0%

[1] All time peak. [2] Peak for 1939. [3] Lowest for 17¼ years. [4] Stocks, August 27, 1938.
[5] Peak prior to 1939. [6] Lowest for year.
[7] Prior to April 29, 1939, data did not include stocks at terminals, in transit, etc., except in California.
[8] Available data for year ago include only stocks at refineries, and not at terminals, in transit, etc., except in California. Those stocks on September 2, 1938 totaled 28,976,000 barrels, and comparable stocks on September 2, 1939, totaled 30,303,000 barrels, or 4.6% more.
[9] Available data for year ago include only stocks at refineries, and not at terminals, in transit, etc., except in California. Those stocks on September 2, 1938, totaled 118,163,000 barrels, and comparable stocks on September 2, 1939, totaled 111,112,000 barrels, or 6.0% less.
[10] Lowest since October, 1922 due to the shutdown of six Mid-Continent states.

Unsold stocks of Gulf Coast refiners down

The Gulf Coast Refiners Association, composed of a group of independent refiners, in reporting its unsold stocks of the various refined products for the week ending September 2 indicated a marked decrease in available motor fuel and aviation gasoline.

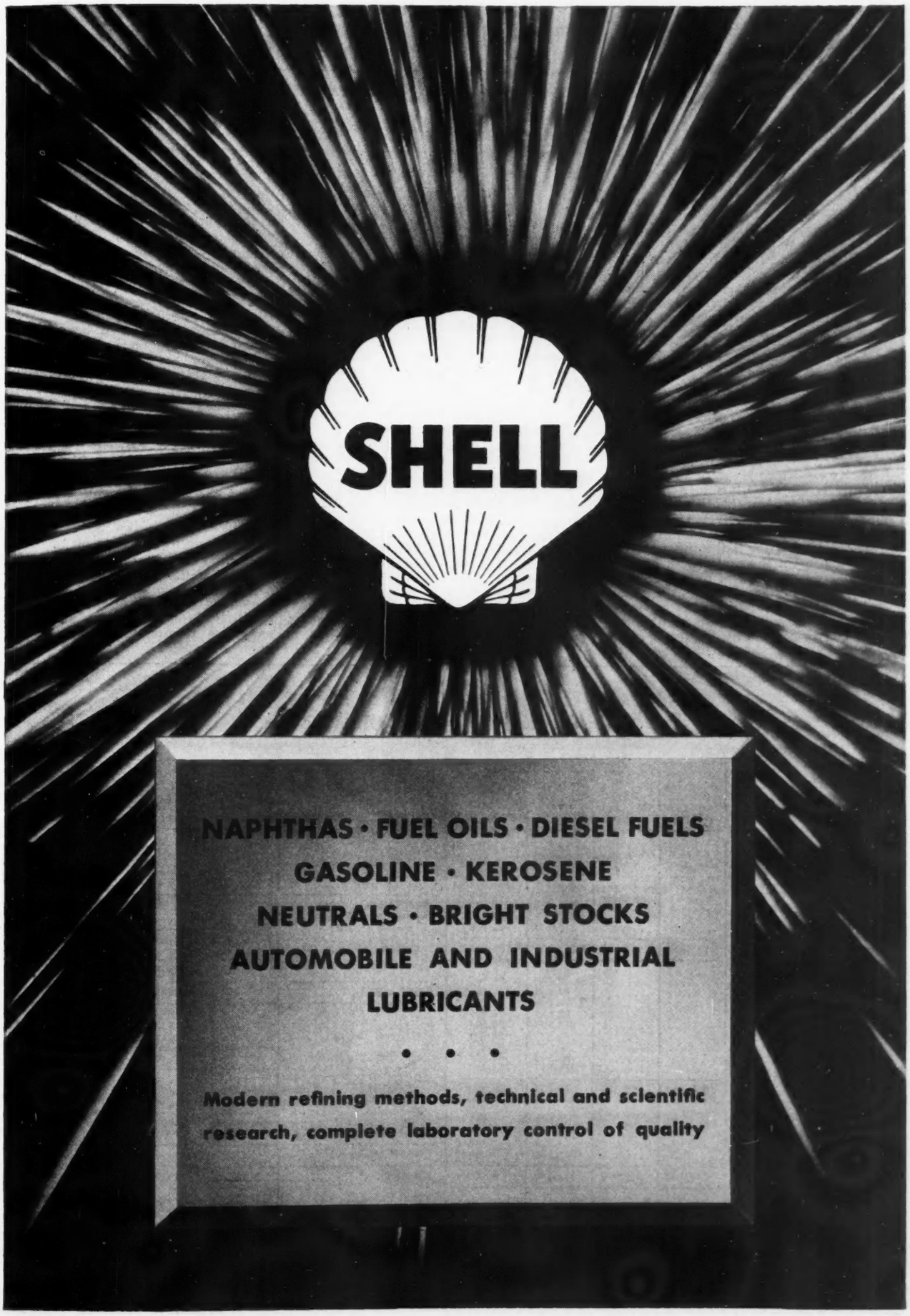
Total unsold motor fuel at the end of the week was reported at 187,599 barrels, as compared to 722,647 barrels the previous week, while aviation gasoline unsold, decreased from 430,674 barrels a week before to 383,414 barrels for the week ending September 2. Stocks of high octane blending naphtha for sale were reduced from 82,000 to 77,600 barrels.

Kerosene stocks available for sale totaled 68,623 barrels, and unsold gas oil stocks were reduced to 75,030 barrels on September 2, as compared with 135,767 barrels the previous week. Unsold stocks of No. 5 fuel oil were reported at 92,220 barrels and again no unsold Bunker C fuel oil was reported.

Crude runs to stills for the week ending September 2 totalled 584,209 barrels (83,458 barrels a day), as compared with runs for the previous week totalling 603,091 barrels.

Cayuga oil moving to coast through new line

Stanolind Pipe Line Company has completed construction of its 35-mile extension line from the Cayuga, Texas, field to its Bullock station and tank farm, near Mexia, and first crude runs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Modern refining methods, technical and scientific
research, complete laboratory control of quality

will be made early this week. This line is made up of 16 miles of 8-inch and 19 miles of 6-inch welded pipe, with a single station at Cayuga providing a maximum capacity of 11,000 barrels daily. Construction work was contracted by Williams Bros., Inc., and welding work was completed September 5.

This new Cayuga outlet will handle low-gravity crude purchased and gathered by Pan-American Pipe Line Company, which has been routing its runs through The Texas Pipe Line Company's system to the Pan-American Refining Corporation's refinery at Texas City. Stanolind Pipe Line Company will transport the oil through its multiple system from Mexia to Sinco Station, near Houston, where deliveries will be made to Pan-American Pipe Line Company's 12-inch line to Texas City.

Two 16,000-barrel storage tanks were erected by Stanolind Pipe Line Company at its Cayuga receiving station.

Short line being built to Loco Hills area

The Texas-New Mexico Pipe Line Company is constructing a 15-mile extension from its Artesia district, Eddy County, New Mexico, station and tank farm, NE NW 21-17s-30e, to the Loco Hills field. The latter is the most active drilling center in the state, with 21 unconnected oil wells. The new line will involve a 5-mile, 6-inch discharge unit, and 10 miles of 4-inch gathering system. It is scheduled to be completed and placed in service by September 20.

Crude Production

Daily output up 1,299,225 barrels from previous week, slightly above figure set by Bureau of Mines

CRUDE oil in the United States during the week ended September 9 was at an average rate of 3,518,375 barrels daily. Under the generally lower allowables production did not attain its pre-shutdown levels; falling 41,725 barrels short of the mark for the week ending August 12, but last week's output was 1,299,225 barrels daily greater than that of the week before. This was only 7675 barrels above Bureau of Mines estimate of demand.

Texas produced 1,397,000 barrels daily, up 533,000 barrels from the week before, but 57,200 and 10,500 barrels, respectively, under state conservation quota and federal allocation.

California produced 618,500 barrels daily in increasing the average of the previous period by 18,200 barrels, and overstepping voluntary proration program by 20,200 barrels, and government forecast by 22,500 barrels.

Oklahoma produced 402,250 barrels daily, compared to 6100 barrels daily for the preceding week. Output at this level was over state allocation by 17,300 barrels but under the bureau estimate 27,050 barrels.

Louisiana reported 239,300 barrels daily, 82,900 barrels more than the week previous, 3825 barrels daily over proration quota, and 16,400 barrels below government recommendation.

Illinois output was held at the pace maintained the previous week—316,850 barrels daily, which is 68,150 barrels over bureau recommendation for the state.

Kansas produced 154,500 barrels daily, compared to 3975 barrels daily for the preceding week. This was 6975 barrels over conservation quota and 11,800 barrels less than the federal forecast.

Third line operating out of Wasson field

Shell Pipe Line Corporation completed and placed in operation last midweek a 31-mile, 6-inch extension line from its Hobbs, New Mexico, trunk line terminus to the Wasson field, centering on Yoakum and Gaines counties, West Texas. It has a capacity of 12,000 barrels daily, or the same as the Hobbs-Wasson lines operated by Humble Pipe Line Company and Aloco Pipe Line Company.

United States Crude Oil Production

Estimates Compiled by THE OIL WEEKLY

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (Sept.)	State Allowable in Sept.	BARRELS DAILY FOR WEEK ENDED Sept. 9	Sept. 2
TEXAS—				
Texas Panhandle			65,650	54,450
North Texas			89,250	51,850
West Central Texas			33,600	15,500
West Texas			256,000	155,000
East Central Texas			99,950	64,000
East Texas Field			383,350	235,700
South Texas			232,000	140,250
Texas Gulf Coast			238,000	148,050
Total Texas	1,408,300	1,455,000*	1,397,800	864,800
CALIFORNIA—				
Long Beach			47,400	56,100
Santa Fe Springs			27,900	27,100
Huntington Beach			27,100	26,200
Dominguez			18,100	17,800
Ventura Avenue			33,600	36,100
Midway-Sunset			45,800	46,100
Kettleman Hills			52,100	52,400
Wilmington			86,800	86,400
Others			279,700	252,100
Total California	596,000	598,300	618,500	600,300
OKLAHOMA—				
Oklahoma City			89,950	1,150
Seminole Area			93,450	1,720
Fitts			13,700	370
Others			205,150	2,860
Total Oklahoma	429,300	384,950	402,250	6,100
LOUISIANA—				
North Louisiana			61,450	38,900
South Louisiana			177,850	117,500
Total Louisiana	255,700	235,475	239,300	156,400

DISTRICT OR STATE	Bureau of Mines Estimate of Daily Demand (Sept.)	State Allowable in Sept.	BARRELS DAILY FOR WEEK ENDED Sept. 9	Sept. 2
ILLINOIS—				
New Pools			309,050	308,250
Old Pools			7,800	7,800
Total Illinois	248,700		316,850	316,050
KANSAS—				
Burrton-Haven			7,350	425
Russell County			22,950	925
Silica			11,900	25
Others			112,300	2,600
Total Kansas	166,300	147,705	154,500	3,975
NEW MEXICO	108,700	100,000	102,250	5,950
EASTERN STATES—				
Pennsylvania Grade			75,100	74,850
Others, Eastern			22,200	22,250
Total Eastern States	101,300		97,300	97,100
ROCKY MOUNTAIN—				
Wyoming	70,700		62,400	66,300
Montana	16,300		16,500	16,650
Colorado	3,700		3,900	4,000
Total Mountain States	90,700		82,800	86,950
MICHIGAN	55,000		54,300	50,250
ARKANSAS	50,700	64,838	52,525	31,075
Total United States	3,510,700		3,518,375	2,219,150

* Pending adjustment hearing September 11: daily average, considering Saturday-Sunday shutdowns, water exemptions and exemptions at Rodessa.
† Recommendation of Central Committee of California Oil Producer's Association.

WEEK'S DRILLING HIGHLIGHTS

North Texas

Southwestern Montague County reported a wildcat 5½ miles from Bowie logging oil sand at 3714 feet. Nocona pool, same county, reported completion of a second prolific well in Upper Strawn. The eastern part of the county suffered a setback when Bonita's discovery offset ran into solid granite.

Illinois

Lease prices soared to $500 an acre in the southeastern part of the state. An Edwards County wildcat was completed in 16 feet of Cypress sand for commercial production. Keensburg field announced 35 active tests.

West Texas

Apco pool, Pecos County, got extended by a prolific Ellenberger producer. An edge well at Keystone field, Winkler County, flowed 500 barrels. The east flank of North Cowden in Ector County continued to record large completions.

California

Wasco got a half mile extension. Gatchell field, Fresno County, also was extended by a well initialling 2000 barrels. Showings in a test indicate an extension for the Amerada pool of the East Coalinga Eocene field.

South Louisiana

A drill-stem test made chances for commercial production on Henderson prospect, St. Martin Parish, look favorable. Storage tanks are being erected prior to a production test on a wildcat near Lafourche Crossing, Lafourche Parish.

New Mexico

Loco Hills in Eddy County has large development in store with completion of pending line outlet.

Oklahoma

Unfavorable showing of an edge well indicates that Ramsey pool has been defined to the north. Coyle pool had two completions, one of which made 655 barrels in 11 hours. A wildcat in Kingfisher County is having trouble with gas which has stopped operations; it also has some showing of oil.

Kansas

Silica and West Elmwood pools were extended, while Iuka pool was defined to the south. There was a noticeable let down in wildcat activity in the state.

Southwest Texas

LaGloria field in Jim Wells County, where distillate production has been found, is yielding oil from a deeper sand. In Live Oak County a new field is indicated by small gas in a Government Wells sand well. The Colorado field in Jim Hogg County got an important extension.

Arkansas

A new gauge on the recent new field opener at Experiment in Columbia County gives a rating of 26 barrels per hour. Three offsets are proposed but work on them has not been started.

Mississippi

Mississippi's first oil well, and the first for the Southeastern states, flowed 92 barrels of 32.8 gravity oil the first 12 hours it was tested. The oil is of good quality.

South Dakota

Camp Crook structure in Hardin County has a test drilling with a heavy rig, contracted to go to 7000 feet. It is hoped that gas may be found, in which event the present line to Minneapolis-St. Paul will be extended on the ore regions in the north.

Wyoming

Sundance oil was discovered last week on Dewey Dome in Weston County. The yield was only 10 barrels per day, but it comes from 982 feet and it is thought an acid dose will increase the flow.

Comparison of Permits Granted for New Wells

STATE	Week Ending Sept. 9	Total this Mo.	Total this Year	Total this Date Last Year	1938 Year Total
Arkansas	3	5	160	175	247
California	21	43	721	868	1,146
Louisiana	....	44	902	918	1,214
Kansas	22	47	1,052	1,109	1,453
Michigan	22	58	974	596	953
N. Mexico *	10	18	74	....	....
Oklahoma	31	54	1,424	1,425	1,978
Texas	122	243	7,180	9,130	12,369
Total	231	512	12,477	14,221	19,360

* Data for New Mexico prior to August not available.

Summary of Wells Completed in the United States Week Ending September 9, 1939

	Completions	Oil Wells	Gas Wells	Failures	Initial Production	Total 1939	Total this Date 1938
Alabama	....	....	....	....	....	....	2
Arizona	....	....	....	....	....	....	....
Arkansas	6	6	....	....	2,182	172	159
California	23	21	....	2	28,479	735	900
Colorado	....	....	....	....	....	15	5
Florida	....	....	....	....	....	....	....
Georgia	....	....	....	....	....	1	1
Illinois	60*†	50*†	....	10	27,008	2,608*†	955
Indiana	9	3	1	5	1,575	134	95
Kansas	21*†	11*†	1	9	60,904	956*†	1,191
Kentucky	11	4	....	7	42	456	535
Louisiana	18	14	....	4	5,055	716	774
Michigan	40	25	3	12	8,358	1,006	618
Mississippi	4	1	....	3	184	11	11
Montana	6	5	....	1	408	105	47
Nebraska	....	....	....	....	....	1	1
New Mexico	10	7	1	2	3,897	430	374
New York	....	....	....	....	....	392	502
North Dakota	....	....	....	....	....	....	....
Ohio	24*	3*	12	9	68	640*	669
Oklahoma	24†	8†	3	13	347	1,433†	1,503
Pennsylvania	19	3	12	4	24	1,090	1,598
South Dakota	....	....	....	....	....	....	....
Tennessee	....	....	....	....	....	....	2
Texas	159	118	5	36	44,085	6,727	9,084
Utah	....	....	....	....	....	....	2
West Virginia	12	4	7	1	37	366	484
Wyoming	3	2	1	....	2,100	97	74
Total this week	449	285	46	118	184,752	18,079	19,485
Total last week	457	296	32	129	172,970	17,630	18,917
Total this year	18,079	12,302	1,289	4,488	13,088,032	....	....

* Includes water input wells. † Includes salt water disposal wells.

Oklahoma Fields

North edge test performance indicates Ramsey pool limit. Coyle pool completion makes 655 barrels oil in 11 hours.

Tulsa. — Mid-Continent Petroleum Corporation and others completed the thirty-fifth producer for Ramsey pool, Payne County, while a north edge producer may define the pool in that direction. Coyle pool received 2 completions with another test drilling plugs in first Wilcox sand. Oklahoma County and Kingfisher County wildcats held the attention of operators.

Within the communitized block, Mid-Continent Petroleum Corporation et al's Ramsey 11, NWc 18-18n-2e, flowed in for the thirty-fifth producer of the pool at a potential of 10,037 barrels daily. First Wilcox sand was topped at 4782 feet and drilled to 4803 feet. In 2 hours it flowed 835 barrels of oil, making over 6,500,000 cubic feet of gas. At the north edge of the prolific pool, Mid-Continent Petroleum Corporation et al's Simpson 2, SWc 7-18n-2e, flowed 51 barrels of oil and 4 barrels of water in 20 minutes and went dead. The test offsets Simpson 1, a 9695-barrel producer, on the west. First Wilcox sand was topped structurally low at 4875 feet and penetrated 7 feet. Operators are choking the well in, hoping for enough gas to kick it off again.

South of Ramsey pool, Murray-Griffey et al's Davis 1, SEc 24-18n-1e, topped Oswego lime at 4066 feet and was drilling below 4295 feet. A thinning in formations was noted between the Dewey and Oswego lime.

The Texas Company completed a large producer in Coyle pool after deepening 8 feet in Wilcox sand. Longan 2, C E½ NW NW 12-17n-1e, hit first Wilcox sand at 4860 feet and drilled to 4888 feet. In 11 hours 655 barrels was run into storage. Same operators' Longan 3, C W½ NE NW 4-17n-12e, was drilling plugs below 4840 feet. On south line of production Helmerich & Payne et al's Collins 2, C W½ NW NW 13-17n-1e, flowed 272 barrels in 24 hours from first Wilcox sand at 4803 feet. At west edge of the pool The Texas Company was drilling below 3425 feet in J. S. Graham 2, C E½ SE SE 11-17n-1e.

Hall-Briscoe encountered a show of oil at Thompson 1, SWc NE 28-13n-1e, 4 miles east of Jones, in Oklahoma County, with 300 feet of oil on a drill-stem test at 4827 feet. At 5145 feet Oswego lime was topped and another show of oil reported at 5151-56 feet. The well is checking structurally higher than T. B. Slick's Martin 1, NWc 13-13n-1e, which topped Pink lime at 5498 feet, Hunton lime at 5620 feet and Wilcox sand at 6015 feet, to be abandoned.

Considerable gas volume held up operations at Anderson-Prichard Oil Corporation et al's Geis 1, C NE SW 15-18n-9w, 4 miles northwest of Loyal, Kingfisher County. At 7347 to 7357 feet in basal Pennsylvanian formation, gas continued to heave the heavily weighted mud in the hole, accompanied by increasing shows of oil. The well is at a stand-still, with no order to test as yet or to drill ahead. The wildcat is on a 7000-acre block of leases held jointly by Anderson-Prichard Oil Corporation and Magnolia Petroleum Company. Close-in holders are Gulf Oil Corporation, Pure Oil Company, Sinclair Prairie Oil Company, Deep Rock Oil Corporation and Ohio Oil Company. Contract depth is 8500 feet or Wilcox sand.

Deep sand pay in Doyle pool, Stephens County, was being tested in 3 wells. Sunray Oil Company's Hefner 1, SEc NW 12-1n-5w, flowed 198 barrels in 6 hours from Deese sand at 5580 feet, being deepened from the Hoxbar horizon at 3821 feet, from which it previously produced. Helmerich & Payne lost some drill pipe in the hole at Graham 1, SWc NE 12-1n-5w. Total depth was 5383 feet and pipe was recovered to 5170 feet. Oolitic lime showed saturation at 5075 feet to 5125 feet and will be tested from a plug-back depth. Deese sand was believed topped as the drill pipe stuck. In West Doyle pool, Phillips Petroleum Company's Coombs 1, SE SW NE 4-1n-5w, a northeast offset to the discovery well, plugged back to 5738 feet and perforated with 12 shots at 5703-10 feet. Only 900 feet of mud rose in the hole with no oil and was bailed out. This test missed the main section of Pennsylvanian sand pay.

A 900,000 cubic foot show of gas was encountered at R. V. Dillard et al's Holcomb 1, SEc SW 25-7n-19w, Hobart area of Kiowa County, from lime formation at 1004 feet. A strong odor of oil accompanied the gas volume. Casing was set atop the pay and drilling is proceeding. Work was started at Shell Oil Company's Kelsay 1A, NWc SW 20-7n-17w, a south offset to the discovery well.

The recent north Earlsboro extension test in Seminole County, George Pace's Hale 1, C SW NE 31-10n-5e, flowed 1024 barrels through ¼-inch choke in 24 hours from Viola lime at 4458 feet. Pipe line connections are being installed. In West Little River extension area, Seminole County, and 1¾ miles north of production in Hazel pool, Sands Petroleum Company staked location for Misselder 1, NWc SE 13-7n-5e.

Olsen area of Osage County stirred up a bit of activity. Tide Water Associated Oil Company completed its test in NEc SE 23-26n-4e, for 50 barrels of oil daily through tubing. Pay was shot with 80 quarts at a plug-back depth of 3170 feet. Surface pipe was set and drilling operations underway in NEc 25-26n-4e. Location was staked for Osage 1, NWc SE 24-26n-4e.

Sands Petroleum Company abandoned its wildcat venture 2½ miles east of Dill pool, Okfuskee County. An electric log showed unfavorable at Mathews 1, C W½ NW SE 5-11n-9e, and hole was given up in lime at 4065 feet.

On initial drill-stem test Rogers & Rogers' Warren 1, SEc 4-6n-8e, Hughes County, made 300 feet of mud, considerable oil and gas in less than 1½ hours. Wilcox sand is the objective.

Sinclair Prairie Oil Company's deep test in the Chickasha gas pool, Charlson 4, NEc SE 22-5n-8w, Grady County, continued to show up poorly on 2 tests. A test at 3181 to 3222 feet showed 2500 feet of salt water and a drill-stem test at 3383 feet showed 250 feet of mud and 200 feet of salt water. The bit was rotating below 3445 feet. The test is an old well completed for gas at 2398 feet with plans calling for the 5100-foot horizon to be tested.

Some dark, heavy shows of oil in Sycamore lime were encountered at Sinclair Prairie Oil Company's German 1, SW NW NW 1-6n-13w, southeast of Carnegie, Caddo County, and drilling proceeded below 6375 feet.

West of Ralston pool, Pawnee County, Olson Oil Company and Wade Paxton were rigging Phillips 1, NEc 5-23n-5e. Magnolia Petroleum Company completed derrick for Johnson 1, SWc NE 29-25n-8w, 2½ miles north of Hillsdale.

W. R. Ramsey et al's Mansfield 1, C NW NE 16-14n-9w, on Calumet structure of Canadian County, was drilling below 3750 feet. Location is on a 10,000-acre block.

Oklahoma Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Caddo—		
Johnson et al's Bigley 2, sec ne 10-5n-9w	*	3593
Carter—		
Keister, Luster 1, nw ne nw 30-2s-3w	5	376
Shell, McClure 58, ne sw se sw 5-4s-3w	*	1115
Comanche—		
McKey, Truitt 1, ne ne sw se 26-2n-11w	3	228
Truitt 2, se ne sw se 26-2n-11w	6	218
Creek—		
Hammill's Blacker 1, ne sw se 6-17n-9e	Abnd.	Lcn.
Crosbie, Mosquito 1, sw nw ne 20-17n-9e	48	2554
Strozier, Thomas 1, nw se sw 20-17n-9e	¶0.2	2670
Nute, Emmens 1, nw nw se nw 18-19n-8e	*	848
Jackson—		
Fish and Fish No. 4 Mattie, nw se nw 5-1s-19w	90	2618
Burnham, Thelma 1, ne se se 6-1s-19w (otd 2595 ft)	45	2420
Lincoln—		
Phillips, Witmer 1, sw se ne 35-15n-2e	¶9	4900
Muskogee—		
Atkins, Williams 1, c se ne 3-15n-18e	*	1513
Noble—		
Shell et al, Mosena 1, csl sw nw se 9-21-2e	*	3200
Okmulgee—		
Garrett, Seaborn 4, 130 ft n cn½ ne se 17-11n-12e	*	2730
Pawnee—		
Johnson, Finley 9, ne nec 28-20n-9e	50	2087
Pontotoc—		
Simpson et al, Lord 1, nw ne ne 3-1n-7e	¶11	1794
Hatcher, Newby 1A, se ne ne 24-5n-4e	*	2541
Pottawatomie—		
Magnolia, Tull Fyke 3, se ne nw 29-7n-5e	100	4103
Smith, Wood 3, sw ne sw 31-7n-5e	*	4227
Seminole—		
Alma, Lack 1A, se nw nw 3-6n-5e	*	4320
Delaney et al, Vance 1, se ne ne 13-6n-5e	*	2800
Sequoyah—		
Thompson, Roby 1, nec 30-12n-22e	*	1912
Tulsa—		
Murry, Willerton 1A, c sw se 17-19n-14e	*	1303
Wagoner—		
Schrulte, Olen 1, sw se se 4-16n-19e	*	1215

*Failures; †Junked; ¶Million cu. ft. gas.

Kansas Field Developments

Silica pool production is extended ¾ mile eastward.
Iuka pool in Pratt County is defined by failure on south.

Wichita.—Kansas field activity during the past week consisted primarily of minor pool extensions and a noticeable letdown in wildcatting.

After considerable test, Central Petroleum Company extended Silica pool, Rice County three quarters of a mile eastward at Dipple 1, C N½ NE SE 27-19-10w. It was initially acidized with 1000 gallons and re-acidized with 2000 gallons in Kansas City-Lansing lime, topped at 2971 and drilled through to 3045 feet. On a 30-hour pumping test, it made 5 barrels of oil and 12 barrels of water per hour to earn a potential of 96 barrels daily. An Arbuckle lime extension for the pool was recorded in Stanolind Oil & Gas Company's Panning 20, SWc NW 11-20-11w, which moved the pool a quarter mile westward. The well rated 2500 barrels daily after acidizing the lime at 3277 feet.

Crown Petroleum Company extended West Ellinwood pool, Barton County, three quarters of a mile westward at Schartz 1, SEc NW 12-20-12w. Hole filled 750 feet with oil from Arbuckle lime topped at 3343 feet and drilled to 3361 feet. The well is surrounded by production of the Wolf pool, Clawson pool and the Marchand pool, all in the same county. Three miles southeast of Beaver pool, a wildcat failed to find commercial production. Bradley Oil Company et al's Dolechek 1, SEc NE 26-16-12w, was abandoned at 3388 feet in basal sand.

Initial oil producer for Arkansas River bed was realized in Derby Oil Company's State 2, NE NW NE 15-20-11w, Ellinwood pool. From Arbuckle dolomite at 3290 feet, the well made a potential of 3094 barrels daily.

Testing was underway at W. H. Brimm et al's Dirks 1, SWc NE 31-18-15w, a half mile east of oil production in the Otis-Albert area. Basal sand was penetrated at 3546 feet and 7-inch casing cemented at 3547 feet prior to drilling plugs.

Three miles east of Ehly pool, Barton County, Solar Oil Company cut Lansing lime at 3020 feet and is drilling for Arbuckle lime.

Iuka pool, Pratt County, was defined on the south as Atlantic Refining Company et al's Hacker 1, CEL SE SW 11-27-13w, filled with salt water when plugs were drilled to 4366 feet. A show of oil previously indicated a chance for production.

Skelly Oil Company added a new producer to the Cunningham oil pool, Pratt County, in Maxedon 1, C N½ S½ SE 25-27-11w. Kansas City-Lansing lime, topped at 3402 feet and bottomed at 3459 feet, was acidized whereupon the hole filled 300 feet with oil in 3 hours, gas volume gauged at 10,000,000 cubic feet.

Cities Service Oil Company's test in the northeast extension area of Silica pool, Rice County, yielded only a spray of oil and 2,000,000 cubic feet of gas when plugs were penetrated at 3302 feet in Arbuckle lime. Operations call for deepening this test, Hathaway 1, CNL NE SW 27-19-10w, which offsets a 2436-barrel Lansing lime well on the east.

By reconditioning an old gas well, flow was greatly increased after the well was temporarily abandoned. Shell Oil Company worked over Maughlin 1, NE NW SE 11-20-8w, in South Lyons gas area of Rice County, to gauge over 13,500,000 cubic feet of gas daily from Arbuckle lime. In northeast extension area, Silica pool, Central Petroleum Company completed derrick for Rolfs 1, W½ NE 27-19-10w.

Three miles northwest of Gates pool, Stafford County, Atlantic Refining Company failed to find production at Harter 1, CEL NE SW 9-21-13w. Arbuckle lime was topped at 3759 feet, drilled to 3795 feet and abandoned. The test ran structurally low from the Lansing lime to the finish.

Helmerich & Payne and Deep Rock Oil Corporation found no shows at Simpson 1, NEc SE 3-11-17w, two miles north of prolific Bemis pool, Ellis County. Electric log disclosed dry Arbuckle lime at 3520 feet to 3530 feet, and hole was given up.

Gas production was extended a quarter mile eastward for Burrton pool, Harvey County. Carl Hipple et al's Frederick 1, NWc SW 17-23-3w, gauged 7,000,000 cubic feet of gas from Chat formation at 3280 feet. First gas flow was encountered at 3266 feet and as drilling proceeded, sufficient volume had gathered to blow the tools up the hole. The chat will be tested for oil production when the gas can be handled.

Shallow Squirrel sand disappointed operators in Johnson County. O. K. Supply Company failed to get a show in Moore 1, SEc SW 11-14-22e, from Squirrel sand at 902 feet, and the test was abandoned.

Two miles east of Wiggins pool, Greenwood County, Aladdin and Marylyn Oil Company staked location for Burke 1, NEc SW 27-24-11e.

Kansas Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Atchison—		
Wakefield et al, National Life 1, c nw ne 17-6s-20e	•	2790
Barton—		
Hollow et al, Schartz 1, sec nw 18-20-11w	35	3335
Cowley—		
McKnab et al, King 1, swc nw 22-31-4e	•	3480
Martin et al, Graham 1, ne se sw 9-32-4e	•	3326
Ellis—		
Shell, Rumsey 21, se sw ne 23-11-17w	14,410	3417
Bay, Ridler "A" 1, sec ne 12-11-18w	44,000	3369
Greenwood—		
Katz, Jackson 1, nw swc 1-25-8e	•	2338
Johnson—		
OK Supply et al, Knabe "C" 1, nw ne se ne 15-14-22e	7	852
Pratt—		
Skelly, Royse 1, c sw 9-28-11w	¶1	4268
Reno—		
Sinclair Prairie, Schroeder 3, nw ne se 36-22-5w (salt water disposal)		4385
Westgate-Greenland, Wood 2, se sw ne 36-22-5w	887	3921
Russell—		
Central, Crisman 1, sw nw ne 20-14-14w	•	3335
Coralena, Sellens 7, c wl sw se nw 17-15-13w	161	3218
Sellens 7, ne nw se 29-15-13w	125	3317
Southern, Sellens 4, sec nw 29-15-13w	312	3328
Wellens Heirs 16, nw ne sw 29-15-13w	852	3296
Balloun, Mudd 1, nec 6-15-14w (otd 3180 ft)	•	3217
Trojan, Fleegler 1, ne se sw 11-15-14w	•	3304
Stafford—		
Continental, Boland 1, nec sw 13-25-13w (otd 4180 ft)	•	4690
Stevens—		
Panhandle Eastern, McClure 1, c se 4-32-38w	¶18	2580
Sumner—		
Wentworth, Latta 4, se ne se 8-30-2w	Abnd.	Lcn.
Champlin, Latta "B" 1, c s½ se nw 9-30-2w	115	3056
Wentworth, Latta "B" 1, nw sw nw 9-30-2w	Abnd.	Lcn.
Woodson—		
Sheedy et al, Eingrey 1, nw sw se se 22-25-15e	•	1583

•Failures; †Junked; ¶Million cu. ft. gas.

Search in Missouri continues without success

St. Joseph, Mo.—Approach of fall finds 18 wells making more or less hole in the Missouri sector of the Forest City basin; one in the Iowa sector and two about to start in Nebraska. Several more starts are in prospect for Missouri.

North Missouri, the area in the basin, has had 7 dry holes drilled in Clay, Platte, Clinton, Putnam, Chariton, Sullivan and Holt counties, which are sprinkled throughout the northwest part of the state. In the same area several shallow tests have been abandoned, some having fairly important oil showings.

One dry hole has been drilled in the basin area of Kansas.

In recent weeks there has been a tendency to spread toward northeast Missouri, particularly since the finding of considerable live oil in Adair County where Mayson Oil Company's McGonigle 1 is drilling in NW 20-63-13. If plans are carried out, Adair County probably will see two more tests and two may be made in Knox County.

Most interesting to geologists is the appearance of the Ste. Genevieve formation, which corresponds to the extremely productive McClosky of Illinois. Missouri was thought to have little or none of the formation, but recent wells tend to show that northwest Missouri has it in comparative abundance. Oil showings appeared there in the two Andrew County tests.

Also of interest to geologists is the progress of a Holt County test that was located on magnetometer findings. Something of a controversy has arisen over readings of this instrument. One camp interprets the state geological survey to say that magnetometer highs are sub-surface lows. The other camp denies this heatedly. Thus far Brin & Nathan's Decker 1, C NW NW 1-61-38, Holt County, appears to be running high and if it continues to do so the argument will be won by the second camp.

Three new tests were spudded in north Missouri during August and one in Iowa.

C. E. King of Houston, Texas, spudded Vandereau 1, August 27, in NE SW 18-55-31, Clinton County. In

July his Willis 1, NE SE SE 13-55-32, same county, was pronounced dry at 1886 feet.

Ward McGinnis, who opened the Wiggins pool in Greenwood County, Kansas, spudded McGinnis, Elwell and others' Maple 1 on August 22 in NW SE 3-62-26, Harrison County. Acreage was assembled by H. V. Elwell of Wichita, a pioneer in the Forest City basin. Support was given by Jergens Oil Company of Long Beach, California; Lario Oil Company of Wichita, Kansas, and Skelly Oil Company.

Davis Brothers of Independence, Mo., spudded in Platte County near Parkville in a test for Missouri Valley Oil & Gas Company, but stopped drilling at about 100 feet to fill up a block and check titles. Drilling is to be resumed shortly.

Oscar Groves and others have begun a test in SW SE 8-67-40, Fremont County, Iowa.

August dry holes included the following deep tests:

Buttram Petroleum Company's Vance 1, SW SW NE 35-53-18, Chariton County; abandoned at 936 feet in Arbuckle lime.

H. V. Elwell et al's Taylor 1, NW NE 12-62-21, Sullivan County; abandoned at 1740 feet in Arbuckle lime.

Byram-Jackson-Blair's National Life 1, NW NE 17-6-20, Atchison County, Kansas; abandoned at 2790 in Arbuckle lime.

Eastern Drilling Company stopped work on Williams' NW NW NE 28-53-32, Clay County, at 1844 feet after a few showings of oil and gas; then the abandonment order was rescinded and the test set about drilling to 2000 feet.

One of the most promising north Misssouri tests to date is declared to be Mayson Oil Company's McGonigle 1, NW 20-63-13, Adair County. This test had a rainbow showing around 1073 feet and between 1116 and 1163 feet had free oil in the hole. Operators are drying the hole at the latter depth and considering acidizing.

Best showings for August in northwest Missouri were found in the Hyde-Jones' Holt 1, SE NW NE 34-60-35, and Davis Brothers' Gee 1, NW NW SE 28-60-35, both in Andrew County. The Hyde-Jones well had rainbows at 1330-1340 and 1412 feet and some free oil at 1497 whereabout 50 feet of Ste. Genevieve lime was found. The Davis Brothers well had a good showing in the Ste. Genevieve at about the same depth.

George Moore had a showing of oil in Moss 1, NW SW SE 30-65-24, Mercer County, at 1400 feet. Hulse & Christopher's Wiston 1, SE SW NE 22-49-32, Jackson County, was shot following discovery of saturation in the Wayside sand between 470 and 495 feet. Although there was about 220 feet of free oil, the hole did not clean itself and operators have not continued with the test. Loomis-Jordan-Wells' Macy 1, NE SW NW 10-53-27, Ray County, was abandoned at about 600 feet. A good showing of 32-gravity crude was found at 330 feet.

Some operators believe the Wayside sand, which is marked by gas or oil in Clay, Ray and Clinton counties, will yet produce a well of commercial proportions. Ben Hall of Kansas City is one of these and has drilled several shallow tests in the vicinity of 35-52-32, Clay County.

Illinois Developments

Lease prices soar in southeastern part of state.

Cypress sand wildcat believed good for 500 barrels.

Mattoon, Ill.—Southeastern Illinois, an area including Edwards, Wabash and White counties, continued to outshine the rest of the state last week, with prospects in one area skyrocketing lease prices to as high as $500 an acre.

C. G. McFadden et al's Charles Bump 1, C SE SW 34-2s-14w, wildcat 2 miles north and east of Grayville, French Creek Township, Edwards County, was being completed in 16 feet of Cypress saturation after a lengthy struggle cleaning out hole. The well blew when the cement plug cracked as drilling in started. The wildcat was believed to be good for 500 barrels daily. Two miles north, H. K. Riddle's Fred Schroeder 1, NE NE 22-2s-14w, was nearing the Cypress sand.

Three wells were preparing to drill in the vicinity of Kingwood Oil Company's V. V. Johnson 1, which opened a McClosky lime pool a month ago just west of Grayville. Offsetting the discovery 660 feet east, Magnolia Petroleum Company's E. Etheridge 1, SW SW SW 18-3s-14w, near the White County line, has 8 feet of McClosky saturation, topped at 3120 feet. A south offset, Kingwood Oil Company's Len Steele, NE NE SE 18-3s-11e, and a northeast offset, the company's Edith Helm 1, NW NE NW 18-2s-14w, were described by company officials as not looking as good as the discovery, which flowed 30 barrels an hour on its first test.

Keensburg Booming

Townlot drilling continues at a rapid pace in Keensburg, Wabash County, with more than 35 tests underway and at least another 15 contemplated. Developments were of a routine nature.

Four miles southwest of Grayville and in White County, J. W. Clark has started a wildcat on the Warren A. Johnson farm in Section 12-4s-10e.

The Niagaran lime pool at Sandoval, Marion County, continues to grow, the seventh producer having been completed last week. It is Southwestern Oil & Gas Company's Benoist 23, 660 feet from the north line and 15 feet from the west line, NE 8-2n-1e, starting at between 1400 and 1500 barrels daily. More spectacular was the completion last week of Menhall-Benoist's Benoist 3, NW 8-2n-1e, which averaged 175 barrels an hour for 6 hours after a 5000-gallon acid treatment. It topped 13 feet of pay at 2929 feet.

Still waiting on cement was Joe Miller's Foster 1, NW SW SW 11-1n-2e, a mile east of production in the Lake Centralia-Salem pool of Marion County. Casing was reported set at 2224 feet, a depth that indicates the Salem or St. Louis lime. Its commercial completion would reveal either a new producing horizon in the pool, a new producing area, or an extension. It is generally believed that whatever saturation was recovered came from below the McClosky, the lowest horizon now being produced in the Lake Centralia area. The Salem and St. Louis have not been extensively explored in the Lake Centralia district. Some believe the well is separated from the Lake Centralia-Salem pool by a fault.

In Richland County, Pure Oil Company's Homer C. Coen 1, SE SE SE 36-5n-9e, Denver Township, 2½ miles northeast of the Denver Township pool and 2 miles south of the Jasper County

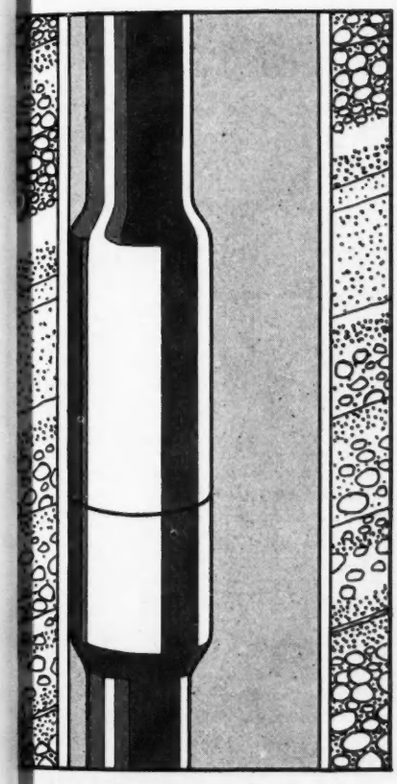
Illinois Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Bond County—		
George Weinschel, Rickher 1	•	2108
Clay County—		
Pure, A. G. Smith 1A	762	3120
Sol Smith 3B	1046	3092
Sol Smith 4B	1029	3100
Hawley O. & G. Co., Chandler 1	8	2987
Crawford County—		
Kingwood Oil Co., Walker 1	•	2960
Fayette County—		
Carter, O. E. Goodsen 7	304	1567
L. Williams 4	404	1585
F. W. Coddington 4	376	1549
Owens 3	•	1525
L. F. Beck 2	96	1585
O. Simmons 2	528	1586
R. F. Coddington 6	384	1555
Lewis Hackert 5	600	1551
J. H. Hiatt 1	327	1560
M. J. Griffith 10	84	1550
Sirilcus Musser 2	352	1591
Cora Larimore 2	340	1583
J. Smith 2	83	1537
Fay Kline 1	300	1510
D. Dotty 3	360	1515
Stewart Oil Co., Durbin 2	•	1660
T. W. Lee, O. P. Anderson 1	6	1586
Stewart Dr. Co., Aldrich 1	240	1570
Gulf, K. Wilhelm 3	82	1572
Jefferson County—		
Carter, Copple 1	140	1948
Madison County—		
R. E. Little, Loyett 1	•	1202
Marion County—		
Texas Co., M. Johnson 5	210	2106
M. Johnson 6	182	2103
N. Young 20	180	1874
D. Hester 2	•	2097
C. Klienschmidt 6	203	1844
F. Lee 7	609	2044
S. Parker 12	1379	1822
Hart & Hart, Young School 1	300	1864
Kingwood-Bell, Shanafelt 15A	760	1880
Magnolia, J. H. Young 52	240	2055
W. B. Young 22	160	2040
J. H. Young 43	360	1865
J. H. Young 45	1080	1822
Tomberlin, Young Strip 2	700	2057
Quincy Oil Co., C. Hester 1	175	2147
Smith & Pekros, C. Hester 1	144	2112
W. C. McBride, N. L. Lee 11	960	1838
N. L. Lee 12	4440	2054
N. L. Lee 13	2797	2055
N. L. Lee 14	378	1778
N. L. Lee 15	708	1852
Monroe County—		
J. E. Cummings, J. H. Boyer 1	•	910
Richland County—		
Pure, Sayre Consolidated 1	169	3029
Otie Baker 1	59	3049
Schuyler County—		
H. M. Miller, Fellheimer 1	•	678
Wabash County—		
Mammouth P. & R., Wm. Dunn 1	•	2901
Washington County—		
Magnolia, Kurwicki 6	22	1290
Emma McConnell 2	24	1292
Wayne County—		
Clark Dr. Co., Eureka School 1	600	3278
G. Davis, Sprague 3	40	3277
Puckett, W. O. Vaughn 1	786	3406
Carl Robinson, Felix 3	1500	3433
Williamson County—		
Reece & Roberts, T. Arnold 1	•	2397

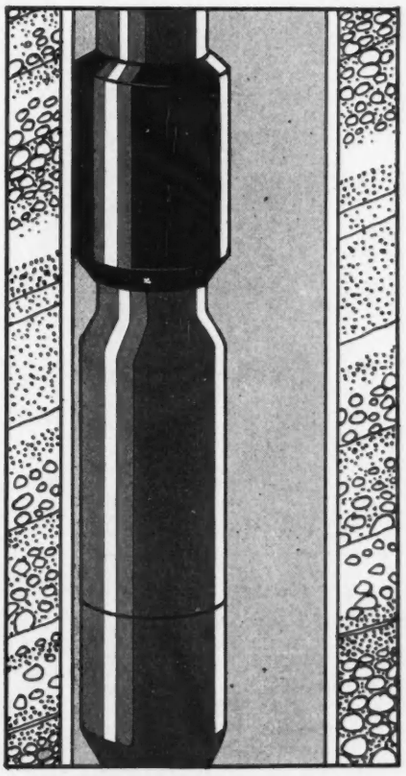
•Failures; †Junked; ‡Million cu. ft. gas.

TOUGH!

IS THE INDUSTRIES' WORD FOR P-B PROTECTORS



METAL-TO-METAL CONTACT WEARS OUT PIPE AND CASING



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line, was completed as a large McClosky lime well. Lacking official confirmation, rumors on initial production ranged from 2000 to 4000 barrels a day. The company located Cora Clark 1 as an east offset, Section 31-5n-10e, and started drilling Lillie I. Coen 1, Section 36-5n-10e, in Preston Township.

Gulf Oil Company's Devonian lime test in the St. James pool of Fayette County was drilling below 2700 feet. It is Smail 3, dry in both the Weiler and Benoist and with only 9 feet of broken non-commercial McClosky.

Pennsylvania Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Allegheny County—		
Boyer & Gibson, Humphrey 1	¶.30	2515
McGuigan O&G Co., Stewart 1	*	1198
Butler County—		
Wm. Pfeifer, I. Beame 3	4	1445
Clarion County—		
Squirrel Hill O&G Co., Sloan 1	¶.12	2965
Indiana County—		
Galbreth et al, McQuilken 1	¶.03	....
Equitable Gas Co., Parks 1	*	3250
Potter County—		
Belmont Quadrangle Dr. Co., Kemp 2	¶25.00	4984
G. L. Cabot, Inc., Dickerson 1	¶10.00	4980
Washington County—		
Union G. & O. Corp., Craft 818	15	2830
C. T. Conn 3	5	950
Keystone Dr. Co., Neil 1	¶.18	1590
Allegheny County—		
Gray et al, Alter 1	¶.08	1515
Armstrong County—		
Wray et al, W. Upperman 1	¶.50	1325
L. F. Watson, H. Boyer 1	¶.05	3469
Peoples Nat. Gas Co., Harkleroad 1	¶	3403
Fayette County—		
Vaughn et al, Newcomer 1	*	2525
Indiana County—		
Mehan et al, Shields 1	¶	3540
Washington County—		
Lewis et al, McVey 1	*	....
Westmoreland County—		
Peoples Nat. Gas Co., Crawford 1	¶.23	3565

*Failures; †Junked; ¶Million cu. ft. gas.

Ohio Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Athens County—		
Speary Oil & Gas Co., R. A. Smith 7	*	524
D. T. Orndoff, H. A. Wolf 1	¶.10	1597
Ohio Fuel Gas Co., Sunday Creek Coal Co., 171	*	1262
Columbiana County—		
Natural Gas Co. of West Virginia, E. W. Strudthof 1	*	4438
Guernsey County—		
H. Clymer, M. Wells 1	¶	1220
Stranges et al, W. Thompson 1	*	1600
Hocking County—		
Preston Oil Co., Sunday Creek Coal Co. 1686	5	3502
Holmes County—		
Mehowa Oil & Gas Co., G. E. Huston 3	*	837
Knox County—		
Ohio Fuel Gas Co., J. & O. Harrod 1	¶.20	2820
J. & O. Harrod 2	¶.26	2757
Lawrence County—		
National Drilling Co., E. C. Culbertson 1	*	3170
Licking County—		
Ohio Fuel Gas Co., M. Glover 1	*	2646
Midland Oil Co., M. Bowers 6	60	3100
Shnider & Davis, J. Matthews 3	¶.52	2554
Lorain County—		
C. A. McMillen, H. Sooy 1	¶.18	2455
Meigs County—		
C. Wilford, Swick 1	¶.12	677
Monroe County—		
Braden & Creighton, H. Blazer 1	¶.47	1583
Muskingum County—		
Atha Oil Co., E. Perrine 1	¶.50	3328
Noble County—		
D. R. Greenlees et al, Belle Oil & Gas Co. 4	3	1668
Yoker Valley Oil & Gas Co., J. L. Dollison 2	¶.32	1590
Ohio Fuel Gas Co., M. W. Consolidated 1	¶.95	1399
Washington County—		
C. D. Fogle et al, Marietta Realty 2	*	515
Moore Farm Oil Co., Dayton Mindling 2	*	1776
Wood County—		
J. H. Crites, E. M. Werner	¶.40	1201

*Failures; †Junked; ¶Million cu. ft. gas.

Kentucky Fields

Yingling & Hayes wildcat coring for McClosky lime

Owensboro, Ky.—Yingling & Hayes' Silas Nunn Heirs 1, a wildcat 1500 feet from the south line and on the east line, Section 18-0-25, was coring for the McClosky lime at 2250 feet. Near the Junction of the Green and Ohio rivers, Perry Tichenor's Strother Banks 1 was tied up with a fishing job at 2317 feet.

Six new wildcats, scattered over five counties, were included in the week's report of new work. In Breckenridge County, L. L. Benoist et al's Walter Mooreman 1, 1600 feet from the south and 1650 feet from the east line, Section 21-0-36, had rig up; in Caldwell County, John Wooten et al's Morse 1, 1800 feet from the east and 400 feet from the north line, Section 12-1-20, was rigging up rotary; in Daviess County, A. D. Shaffer et al's S. T. Burns Estate 1, 1700 feet from the south line and 400 feet from the west line, Section 3-N-29, was drilling at 125 feet, and Jack Cox's Dr. Smith 1, 375 feet from the south and 5800 feet from the north line, Section 4-Q-31, was spudding; in Hancock County, Garland & Henderson's T. Jackson 1, 500 feet from the west and 3500 feet from the south line, Section 22-P-33, was standing at 40 feet, and in Livingston County, J. Harvey Dunn et al's H. L. Dunn 1, 2250 feet from the west line and 1400 feet from the south line, Section 18-H-14, was a rig.

Major Oil Company's Rowan 1, in the town of Livermore, McLean County, was completed for a 15-barrel well with bottom at 1630 feet.

Three miles northeast of Elkton, Todd County, L. O. Bradford's Randolph Hadden 1 was plugging back in an effort to develop a gas showing in a stray sand.

Indiana Activities

Posey County wildcat may produce from Pennsylvanian

Evansville, Ind.—Haynes & Thomas' Walter Seifert 1, NE NW SE 19-6s-12w, Marrs Township, Posey County, cleaning out following a nitroglycerine shot in the Pennsylvanian at 400 feet, is expected to make 20 to 25 barrels a day from the shallow sand to open a new field. In Point Township of this county, Morgan H. Brown and Ray Ryan's Isaac Wolf 1, SW SW 30-7s-14w, was drilling ahead to the McClosky after recovering a good oil show in the Cypress.

Longhorn Oil Corp.'s (C. M. Lane's) Dr. McCarty 1, NW SE NW 13-2s-11w, a Gibson County wildcat, topped the Ste. Genevieve at 1987 feet and was abandoned at 2200 feet. Paul A. Davis et al's Prudential Life Insurance Co. 1, NW NW NW 36-1n-10w, Gibson County, was a new wildcat start. Derrick was up and pits dug.

Another wildcat start was in Vandenburg County. John L. Drake's K. Keil 1, 200 feet from the north line and 300 feet from the west line, NW 5-6s-10w, was drilling below surface pipe.

A 5-foot core in the Devonian at Lowell T. Phillips' Truman S. Phillips 2, 330 feet from the south line and 330 feet from the west line, NW SW 32-4s-6w, Pigeon Township, Warrick County, showed saturation but was not sufficiently porous for commercial production. Shut down at 2815 feet, a heavier cable rig will be moved in to deepen the hole. Also shut down, at 1650 feet, was Fred McWilliams' Alva Edwards 1, 300 feet from the north line and 300 feet from the west line, SE SE 24-5s-9w, near Millersburg, Warrick County.

Illinois operators accused of not obtaining permits

Declaring that many operators were failing to obtain permits before starting new wells, the Illinois Department of Mines & Minerals last week warned that the permit law passed during the recent legislative session provides a penalty of $1000 for each violation and additional penalties of $500 for each 10 days in which the violation continues.

Kentucky Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Butler County—		
M. P. Evans, Givens 1	*	515
Daviess County—		
Vickers & Smith, Turley 1	*	1499
Lion Oil & Refining Co., Foster 5	*	1590
Hancock County—		
Walker et al, Bivens 1	15	666
Henderson County—		
Ralston & Sales, Stewart 2	*	2166
Lee County—		
R. T. Barnes & Co., Shackleford 2	*	....
McLean County—		
Major Oil Co., Rowan 1	20	1674
Lucky 13 Syndicate, Conrad 6	*	2607
Muhlenberg County—		
Jenkins et al, J. Arrendell 1	*	1689
Ohio County—		
Leeper Oil Co., E. Ford 8	5	742
Powell County—		
Joe T. Brown, Lowery 6	2	....

*Failures; †Junked; ¶Million cu. ft. gas.

Indiana Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Gibson County—		
Lewis Prod. Co., Cooper B-2	900	2515
Cooper B-3	475	2527
Lawson et al, Brown 1	*	2240
Lambert Drilling Co., Kries 1	*	2962
Longhorn Oil Co., McCarthy 1	*	2200
Martin County —		
Norris & Gilmore, Strange 1	*	491
Spencer County—		
B. K. Maitland, Gross 3	¶.08	727
Damron Bros., Wright 1	*	1650
Vigo County—		
Siosi Co., Fenton 1	200	2140

*Failures; †Junked; ¶Million cu. ft. gas.

West Virginia Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Boone County—		
Pure Oil Co., L. N. Lutphin 1	¶.68	4872
Braxton County—		
Pittsburgh and West Virginia Gas Co., E. F. Martin 7677	¶1.30	1441
Cabel County—		
R. H. Adkins, U. G. Bledsoe	¶.17	2216
L. Bledsoe 1	¶.20	2223
Kanawha County—		
Ajax Gas Co., A. F. Trent 1	¶.16	3978
Lincoln County—		
Garrett Gas Co., G. Lovejoy 1	10	1730
Ritchie County —		
Square Oil Co., M. Carpenter 4	25	2075
C. Barker, L. Barker 1	¶1.98	1566
Roane County—		
Rogers Properties Co., A. Moore 3	1	1868
T. W. Kennedy, B. F. Winters 1	¶.50	1540
Morely et al, W. P. Harper 1	*	1595
Wirt County—		
Silman & Whitecotton, T. Ash 1	1	296

*Failures; †Junked; ¶Million cu. ft. gas.

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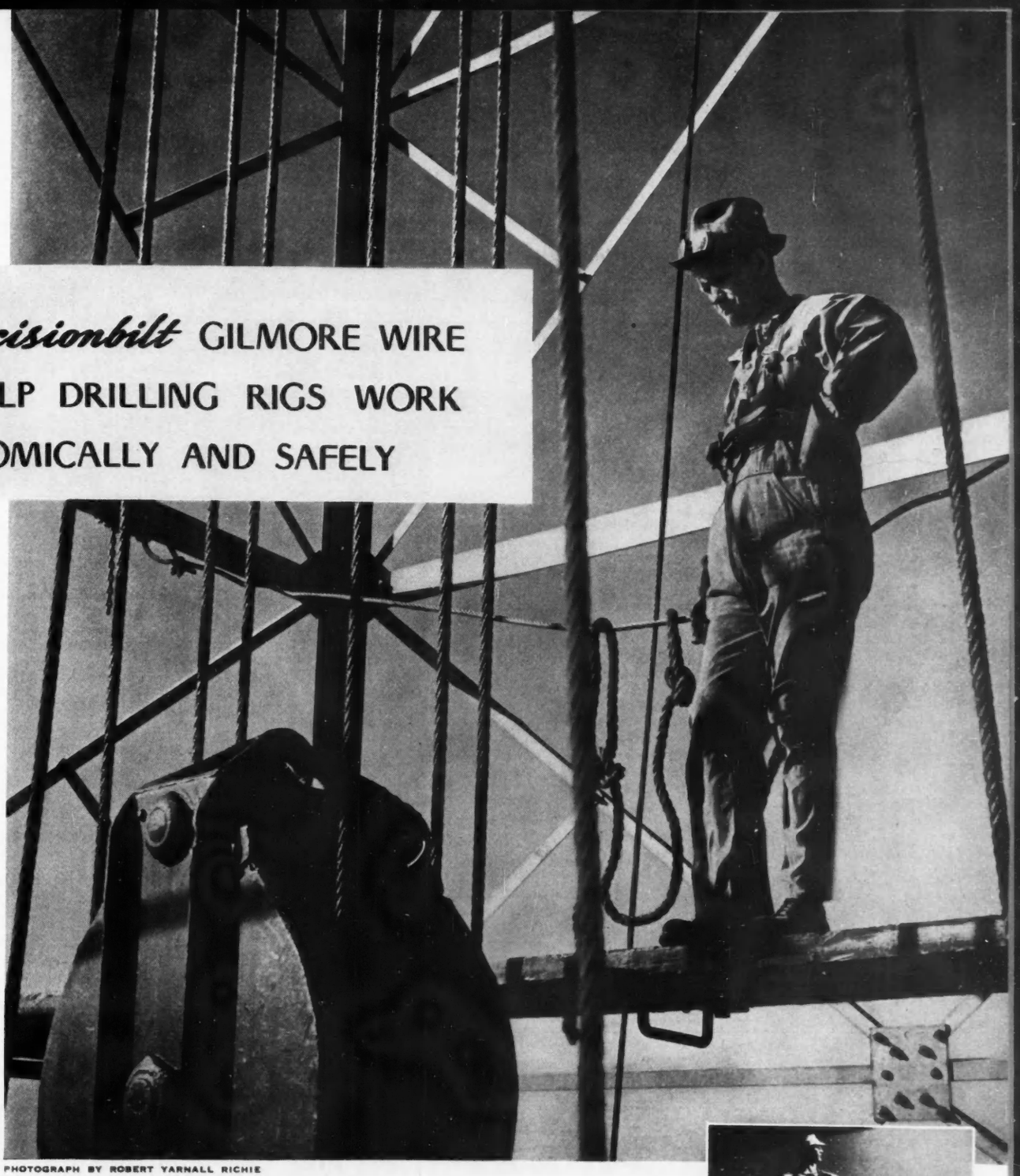

PHOTOGRAPH BY ROBERT YARNALL RICHIE

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North Texas Fields

Southwestern Montague County wildcat logs showing.

Nocona field rating enhanced by second completion.

Wichita Falls.—Southwestern Montague County gained encouragement for deep lime production when S. J. Sackett and Continental Oil Company's Brown 1, NWc S½ SE E. T. Ry. Section 58, 5½ miles northeast of Bowie, logged oil sand at 3714-19 feet, followed by three feet of sandy-lime, carrying oil odor. Formation tester used at 3710-26 feet yielded drilling mud with a light show of oil. Coring was under way at 3750 feet, according to late reports. It is in the Strawn section.

Completion of a second prolific natural producer from the Upper Strawn in the Nocona deep pool, Montague County, gives the area a better rating as a source of high gravity oil.

Rogers & Rogers' Burnett 2, located 830 feet southeast of their 4600-foot discovery producer, tested 316 barrels of oil in 3 hours through ½-inch tubing choke after plugging back from 4750 feet to 4402 feet. Casing was gun-perforated opposite sand at 4278-87 feet and 4292-4304 feet. Pressure on the casing dropped from 900 to 600 pounds and tubing pressure was lowered from 1100 pounds to 650 pounds during the proration test. Pressure declines were not as great as those registered by most Strawn wells in North Texas when placed on production. Youngblood & Foree's Davis 1 previously proved this upper zone for production in making a flow of 150 barrels of 43-gravity oil in 3 hours through ¾-inch choke after perforating opposite sand at 4317-38 feet, having plugged back from 4678 feet to 4575 feet. Both wells checked low on the discovery horizon, which carried water.

The 5 deep wells on the west side of Nocona townsite have a base allowable of 100 barrels daily each. The oil is being marketed by tank cars consigned to a refinery at Burkburnett, and also by tank trucks to a refinery at Gainesville. A pipe line connection is pending.

Solid granite encountered by Phillips Petroleum Company's Custers 1, east offset to the first Lower Strawn producer for Bonita pool, eastern Montague County, altered the outlook for the area. Custers 1 logged top of granite wash at 3694 feet and quit in granite at 3735-67½ feet. A formation tester yielded trace of oil and gas with drilling mud. United Producers Company and Continental Oil Company's Braman 1, southeast outpost and the second completion from the Lower Strawn, flowed 8½ barrels of oil hourly through ⅛-inch choke on completion gauge from sand and granite wash at 3798-3844 feet.

British-American Oil Producing Company's Parkey 1, north offset to its Caddo lime discovery in the Mankins deep area, Archer County, flowed 665 barrels of oil natural in 7 hours while running tubing to complete in saturated lime at 4653-84 feet. This well previously flowed 750 barrels initial through casing.

Demand for the high gravity crude produced in the district materially strengthened the past week as a sequel to the 14-day shutdown late in August and the possibilities of an upturn in gasoline sales arising from the European war. Pipe line companies have made surveys of the unconnected well situation and are considering extension lines to areas that offer sufficient crude to warrant the expenditure. Relief for about 1000 barrels of daily production in Jack County is promised.

Ramsey Petroleum Corporation, Youngblood & Foree's Wynn 1, Clay County wildcat, was drilling at 5760 feet in Smithwick shale, topped at 5710 feet, and will continue to the Caddo section.

Increase allowable

The Texas Railroad Commission has entered an order effective September 1, increasing the allowable for wells in the Douglas sand of Turkey Creek field from 93 to 100 barrels daily.

Texas Panhandle Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Carson County—		
Cities Service, Burnett 32-A	¶35.5	2758
Skelly, H. Schafer 97	375	3185
Gray County—		
Hagy-Harrington & Marsh, C. E. Evans 1	¶7.7	2662
Magnolia, J. J. Wall 2	160	3288
Hutchinson County—		
Power Pet. Co., W. B. Halle 4	371	3101
Moore County—		
Panhandle Eastern, Sneed 1-24	¶17	2910

*Failures; †Junked; ¶Million cu. ft. gas.

North Texas Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Archer County (K-M-A)—		
H. A. Schaffer Oil Co., Ferguson 7-A, blk 15	544	3866
Archer County—		
Bonner Co. et al, Stinnett 4, sec 19	*	742
Cable Oil Co., Crowley-Thuman 8, blk 5	160	977
C. W. Cahoon, Jr., et al, Cowan 1, sec 15	2	1132
Cato Oil Co., Cowan 5, sec 62	12	1016
Edwards et al, Hutcheson 1, blk 142	*	650
Baylor County—		
Bowen et al, Portwood 2-B, sec 1279	*	1439
Clay County—		
Tanner et al, Rigsby-Texaco 13	5	217
Clay County (Wildcat)—		
Burns et al, Calloway 1, lot 9	*	5353
Frabor-Hodges Corp.-Sinclair Prairie, Kinder 1, blk 2	107	5527
Jack County—		
Evans et al, Knox 1	*	470
Grace & Barrow, Hoefle 5	*	485
Hanlon & Buchanan, Bouldin 4, blk 3	270	2742
Holbrook & Woods, McDonald-Allen 2, sec 1	*	481
McCutchin et al, Clayton 2	125	3111
Montague County—		
Falls Ref. Co.-Yeargin, Bouldin 7	*	743
Bouldin 8	8	820
Montague County (Bonita)—		
United Prod.-Conoco, Braham 1	204	3844
Montague County (Nocona Deep)—		
Rogers & Rogers, Burnett 2 (pb to 4402 ft)	2528	4750
Youngblood & Foree, Davis 1 (pb to 4575 ft)	1200	4678
Wichita County (K-M-A)—		
McCutchin et al, Waggoner Bros. 1-A, lot 5	288	4155
Wichita County—		
Deaton & Boardman, Warren 10	*	315
Magnolia, H. Reilly 153	210	1346
H. Reilly 154	*	1435
Perkins & Cullum, Burnett 19-A, sec 1	10	1530
Wichita County (Wildcat)—		
Staley Oil Co. et al, Banta 1	*	4586
Wilbarger County—		
Pols & Schulz, J. P. King 1	388	1900
Waggoner Ref. Co., Waggoner Est. 27-AA, sec 14	60	1695
Young County—		
Miller & Fisher, Hutto-Hutchings 1, sec 230	*	1226

*Failures; †Junked; ¶Million cu ft gas.

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West Texas Fields

Apco extended by prolific Ellenberger producer.

Wasson-Bennett area anticipates more drilling.

Midland, Texas. — Prolific oil flow from the Ellenberger horizon in the Apco pool, Pecos County, was attained through the use of acid in a well that failed to indicate commercial production on an earlier swabbing test. Production was advanced ¼ mile southwest of the discovery well when Magnolia Petroleum Company's Masterson 1, C E¼ W¼ H&GN Section 104, Block 10, responded to treatment with 500 gallons of acid in porous lime at 4596-4614 feet with a flow of 110 barrels the first hour and an average of 75 barrels hourly the next two hours through tubing. It later gauged 1025 barrels of 41-gravity oil in 10½ hours through ¾-inch choke, and then shut in for tankage and a pipe line connection. Prior to the acid injection the well swabbed 20 barrels of 34.7-gravity oil in 12 hours, then 10 barrels of oil in 9 hours. The Simpson section of the Ordovician was absent in Masterson 1, as was the case in the original deep strike, and a dry detrital zone was logged at 4579-96 feet, with an elevation of 2429 feet.

To Cause Drilling

Performance of Magnolia Petroleum Company's well will encourage more development in the immediate area, and possibly the use of acid on Anderson-Prichard Oil Corporation and Monte Warner's Ellenberger discovery, which flowed 184 barrels initially from Ellenberger at 4545-95 feet. The comparatively shallow depth of the Ellenberger pay in Apco pool makes it possible for smaller operators to participate.

Greater demand for all grades of West Texas crude has been evident since the 2-week production holiday forced all buyers to reduce their stocks of oil below desired levels. A substantial gain in routine field operations is in store for the district, and will be particularly noticeable in the Wasson-Bennett district. The restriction of production below allowables fixed by the commission was removed the past week in the above district as a result of Shell Pipe Line Corporation having placed its 6-inch carrier in service.

Outpost Running Low

An unfavorable structural position was recorded by Fred M. Allison Producing Company et al's Bush 1, SW NW SW Section 629, only major outpost underway for the Wasson-Bennett district, Yoakum County. Bush 1 logged top of solid lime at 4860 feet, or 1284 feet subsea, and was coring at 5280 feet with nominal oil stain in samples. It is 1½ miles northeast of the original producer for the Bennett sector which logged top of solid lime at 1098 feet subsea, and is 1-1/3 miles due south of Shell Oil Company's Waples-Platter 1, which logged same marker at minus 1188 feet.

J. T. Barnes et al's M. E. Crum 5-B, northeast edge of the Keystone field, Winkler County, flowed natural at the rate of 500 barrels daily from sandy-lime at 3346-3415 feet. A bridge formed after the well was shot with 360 quarts of nitro.

Stanolind Oil & Gas Company's Rayner 1, discovery producer for the Cedar Lake structure, northeastern Gaines County, has plugged back to 4770 feet to acidize. Bottom-hole water was encountered in drilling to 4830 feet; plugging back to 4783 feet failed to exclude all of the water. However, the well produced 237 barrels of oil and 40 barrels of water in 24 hours at the latter depth.

A 4-well drilling obligation was assumed by the Osage Drilling Company in acquiring a 498-acre lease from the Ohio Oil Company on the northwest edge of the Seminole field, Gaines County, with the latter retaining 7/32 over-riding royalty. The acreage embraces all of W. T. Section 266, Block G, excepting the northwest 62 acres held by Amerada Petroleum Corporation and the E½ NE on which 2 flowing wells were completed jointly by Atlantic Refining Company and Osage Drilling Company. Two of the contracted tests will offset the producers, and the first is Tippett 1-A, C NW NE Section 266.

Seminole Large Reserve

Seminole is the largest producing area in the district without a pipe line connection. Production from the 13 wells is transported at the owners' expense by tank truck to the Humble Pipe Line Company. The volume of proved acreage and the production performance of individual wells establish the area as a major crude reserve. Large interests control the bulk of the acreage and are inclined to defer unnecessary drilling until a direct pipe line connection is available. Currently the field has 2 active tests. Ohio Oil Company's Gibbs 1, C SE SW Section 230, between the discovery and the north and northwest extensions, was drilling at 3280 feet. It is on a lease that requires production by November 9. Osage Drilling Company's Crain-Shell 1, west offset to a northeast outpost well, was coring oil saturated lime at 5290 feet.

The east flank of North Cowden, Ector County, continues to record outstanding producers in the face of structural dip. Texon Oil & Land Company and Group One Oil Corporation's Midland National Bank 3-A, NWc NE T&P Section 36, earned a potential rating of 4770 barrels of 35-gravity oil with 1,500,000 feet of gas after using 4000 gallons of acid in broken pay at 4292-4400 feet. Tide Water Associated Oil Company and Edson Petroleum Company's Roberts 2, near SW NW NE Section 22, gauged 713 barrels initially through open tubing after a 600-quart nitro shot at 4285-4525 feet. It is ¼ mile north of the partnership's Roberts 1, which recently widened the upper end of the field ½ mile to the east. Roberts 2

West Texas Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Crane County (Church-Fields)—		
Magnolia, University-Hardwick 20.	131	3025
Crane County (Gulf-McElroy)—		
Gulf, McElroy 199	661	2912
Crockett County (Wildcat)—		
Pittman et al, Corbett-Humble 1..	*	2502
Ector County (Goldsmith)—		
Gulf, Goldsmith 212	550	4218
Phillips-Pure, Cowden 65	228	4149
Ector County (North Cowden)—		
Aloco Oil Co., Holt-Texaco 2	1039	4300
Texon O. & L. Co.-Group 1 Oil Corp., Midland Nat'l Bank 3-A	4770	4400
Tide Water Associated & Edson Pet., Roberts 2	713	4525
Ector County (Wildcat)—		
Bodkins et al, Foster-Humble 1..	*	4600
Pecos County (Taylor-Link)—		
Lee Pet. Corp., University 22	112	1690
Letwin-Lippett & Kallison, University 4-D	91	1724
Pecos County (Tobarg)—		
Marvin-Henderson Oil Co., Tippett-Conoco 10-C	23	420
Tippett-Conoco 12-C	12	497
Pecos County (Pecos Valley)—		
Yadon et al, Jackson 1	12	1679
Schleicher County (Wildcat)—		
Opp et al, Jackson 1	106	4081
Upton County (McCamey)—		
Basin Oil Properties, Baker-Gulf 10-B	504	2234
Ward County—		
Magnolia, Geo. Sealy 17-46	204	2806
Texoil Prod., Allen 2	102	2090
Winkler County (Hendrick)—		
Stanolind-Westbrook-Thompson Holding Corp., Hendrick 3-T-F-89	163	2990
Yoakum County (Wasson)—		
Aloco Oil Co., Futch-Texaco 2	436	5230
Johnson-Texaco 4	287	5244
Wooten-Texaco 5	662	5135
Magnolia, Kendrick 1-867	1692	5120

*Failures; †Junked; ¶Million cu. ft. gas.

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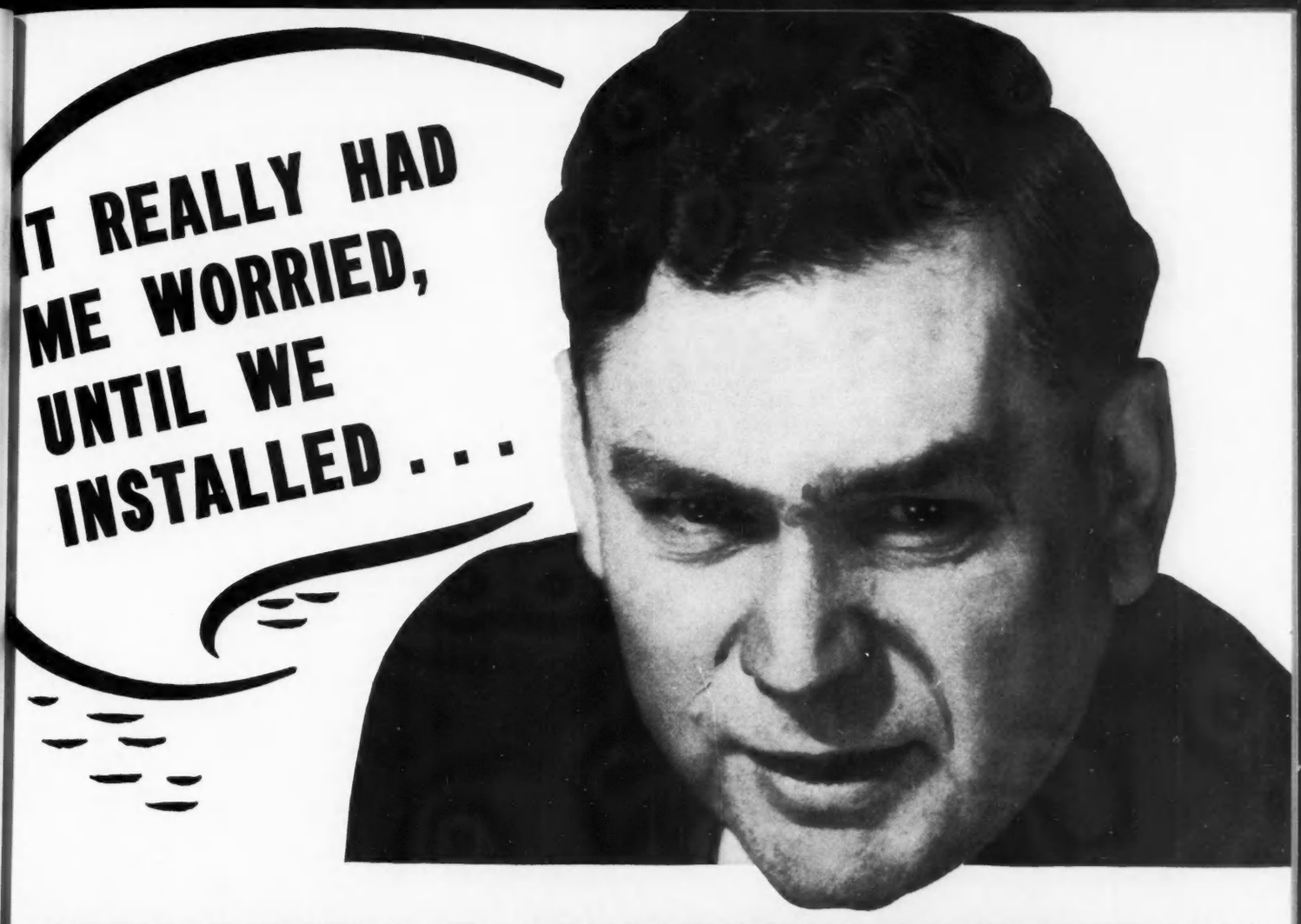

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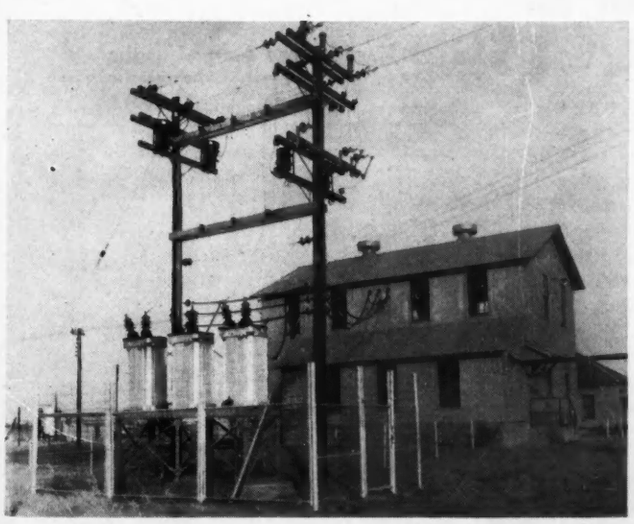

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logged top of solid lime at 4100 feet, with an elevation of 3045 feet.

Expansion of the Sand Hills field, Crane County, ½ mile northeast materialized when Humble Oil & Refining Company et al's Tubb 1-C, SWc PSL Section 6, Block 32, flowed 65 barrels oil hourly after 2-stage treatment of broken pay at 4270-4420 feet with 4000 gallons of acid. The net thickness of the saturated zone totalled 26 feet, being a subnormal pay section.

Forest Development Corporation et al's I. E. Scott 1, C SE H&GN Section 286, Block 13, Reeves County wildcat, was drilling Delaware sand at 4940 feet. Top of Delaware lime was tentatively called at 4807 feet, with an elevation of 3005 feet.

East Texas Fields

Rodessa northwest test to seek new fault

Shreveport. — Northwest of production in the Cass County, Texas, part of Rodessa and apparently trying for a fault off the main Rodessa fault, G. Scott Hammond and associates last week spudded Florence & Price 1, Charles Ames Survey, 660 feet north of south line and midway between east and west lines of west 40-acres of a 125-acre tract. Red Iron Drilling Company has contract. This group has approximately 1500 acres in leases and royalties.

Southeast of Hemphill, Sabine County, Texas, Ed C. Smith of Center, Texas, has leased over 2000 acres around the J. S. Chiveral and J. L. Bourland Surveys. In San Augustine County near McCune Crossroads, Stanolind Oil & Gas Company has a gravimeter unit working. Humble Oil & Refining Company's seismograph unit working in Shelby County is now employed near Arcadia.

Arkansas Fuel Oil Company's Taylor 1, Simpson Holloway Survey, located 6000 feet outside deep production at Waskom, Harrison County, drilled at 6105 feet in sandy shale and lime after a drill-stem test in the Travis Peak at 5925-52 feet with ½-inch chokes at top and bottom opened 12 minutes showed estimated 20 million cubic feet of gas daily, building 575 pounds pressure and showing 420 feet of drilling mud cut with distillate. The well had also shown for a 20 million foot gasser in the Glen Rose.

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122 Drilling permits in Texas

Permits for drilling 122 new wells in Texas were approved by the Texas Railroad Commission last week, one more than was permitted the week before.

There were no permits granted in the East Texas field, although from the remaining portion of the East Texas area 6 locations were reported.

West Texas operators listed 18 locations, while 12 were reported from West Central Texas.

The commission approved 25 locations in the Gulf Coast district, and Southwest Texas operators lead the state with 37 new locations.

From North Texas 15 locations were reported while the Panhandle producers were allowed to drill 9 new wells.

Hearing held on rules for Benavides field

A total displacement factor for gas wells producing from the Wallstad sand in the Benavides field was requested by Republic Production Company at a

East Texas Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Joiner Area—		
Magnolia, C. D. Ashby 11 (41.37-ac)	480	3670
Longview Area—		
Magnolia, C. E. Davis 16 (66.42-ac)	7000	3582
Anderson County (Boggy Creek)—		
A. D. Boyd et al (was Joe Sanders), Liz Smith 1	†	3695
Anderson County (Long Lake)—		
Carter-Gragg Oil Co., McGaughey-Tidal 3	89	5320
Alex McCutchin et al, McGaughey-Johnson 1 (54.9-ac)	*	5366
Houston County (Wildcat)—		
C. C. Dixon et al, Goodman 1	*	2850
Hunt County (Wildcat)—		
K. E. Jennings & R. H. Dooley, V. T. Banks 1	*	3342
McLennan County (Wildcat)—		
M. M. Russell et al, J. B. Lindsey 1	*	415
Trinity County (Wildcat)—		
McAlpine Oil Co., C. V. Dilley 1	*	2386
Titus County (Talco)—		
Humble, Phillips Bros. 2 (51-ac)	327	4354
T. G. Temple 3 (50-ac)	137	4340
Marion County (Jefferson-Rodessa)—		
Phillips, Henderson 3, G. Gillespie sur	130	6006
Texas Co., Braden 5, T. Fitzgerald sur	240	6004

*Failures; †Junked; ¶Million cu. ft. gas.

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hearing before the Texas Railroad Company at a hearing before the Texas Railroad Commission last week. The plan contemplated would limit gas withdrawals from dry gas wells in this sand to the volume taken by oil wells producing from the same sand.

Republic Production Company pointed out that Standard Oil Company of Kansas and Southwood Oil Company are both using gas from this sand to jet wells in other sands in the same field. C. H. Ritz, geologist, expressed the opinion that this practice was causing excessive water encroachment, which had damaged some of the wells owned by his company.

Standard Oil Company of Kansas contended that the water encroachment was normal and that no oil was encountered in the gas well which it has completed.

Witnesses for Republic Production Company testified that the water level, which had risen about 5 feet, should have come up only about three tenths of one foot.

Eureka hearing reset for September 12

A hearing on the Eureka Heights field, Harris County, which was originally scheduled for August 28, has been postponed to September 12 by the Texas Railroad Commission. Operating rules in the field will be considered.

Black plant permit issued for South Texas

Natural Gasoline Corporation has obtained a permit to operate a carbon black plant near its gasoline extraction plant at Aransas Pass, Texas. The permit provides for processing 20,000,000 cubic feet of casinghead residue gas daily.

Southwest Texas Fields

Deeper sand yields first oil producer for LaGloria field.

Vanderbilt-West Ranch area in Jackson County extended.

Corpus Christi.—Swabbing at the rate of nine barrels per hour for three hours without lowering the fluid level below 2000 feet, Magnolia Petroleum Company apparently is completing a good producer to open another deep sand for the LaGloria field of Jim Wells County. The zone, encountered at 7219-32 feet, is in the basal Frio and is the first oil producer for the field.

This discovery well is Dale O. Maun 1, and is one mile west of the discovery distillate producer. It is bottomed at 7233 feet with production coming from perforations at 7219-30 feet, At last reports, the well had not started flowing, but is expected to gain enough pressure to lift the 27.5-gravity crude naturally.

A third test for the pool is drilling at a shallow depth. This test is Stolze 1, about 1¼ miles north of the discovery.

Graham Brothers' Smith 1, 1500 feet east of the Ben Bolt field discovery in Jim Wells County, made salt water through perforations in Frio-Vicksburg sand at 5396-5403 feet, where a drill-stem test previously indicated a good producer. The test likely went to salt water due to a bad cement job. A total of 170 sacks of cement have been squeezed into the formation and the well will be retested in the same zone.

Nueces County's potential discovery of a crude level for the Agua Dulce field met with disappointment. Union Producing Company's W. H. Wallace 1, ¾ mile northeast of the field, perforated at 6770-92 feet and made salt water. A second test at 6640-50 feet also showed salt water and the hole again was squeezed. The test will be tested at 6616-31 feet where another sand was indicated. If these fail, it likely will be completed in one of the regular distillate sands of the field found at a shallower level.

E. A. Graham's Taylor 1, about 1¼ miles east of the Clara Driscoll field is being carried ahead to 7500 feet. It previously had completed a 6000-foot contract, but is being deepened to test the several zones now producing in the field to the west.

Wellington Oil Company was continuing to test Welder 6, west outpost to the Angelita field of San Patricio County, in an attempt to open a new producing zone for the area. Perforations were made at 6225-33 feet but unsatisfactory results were obtained.

South Texas Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
CORPUS CHRISTI DISTRICT		
Aransas County—		
Baytex, Taber (Duphone) 1 (McCampbell)	500	7211
Culton, Barry 1-B (McCampbell)	500	6792
Brooks County—		
Humble, McGill 22 (Kelsey)	350	4739
McGill 23 (Kelsey)	300	4730
Jackson County—		
Humble, Kubecka 1 (Cordelle)	250	2755
Jim Wells County—		
Osborn & Fleet, Bankers Mortgage 2-B (East Alice)	350	5385
Goldston, Morgan 1 (Reynolds)	*	5203
Spice, Schallert 1 (WC) 9 mi ne Alice, Los Presenos gr.	*	5611
Texas Gulf, Miller 4-A (Reynolds)	400	5170
Nueces County—		
Southern Minerals, Isensee 9 (Saxet)	600	4735
Refugio County:		
Quintana, Heard 33 (Tomoconnor)	1100	5925
Shield, Sasse 4 (La Rosa)	400	5415
San Patricio County—		
Allen & Morris, Baldwin 1 (East White Point)	700	5638
Davidor, Harris 1 (McCampbell)	800	7250
Houston, Fee 1 (East White Point)	700	5638
Victoria County—		
Gulf, Traylor B-23 (Heyser)	350	6492
Mayo, Vogt 1 (WC), Victoria	¶5	5523
SAN ANTONIO DISTRICT		
Bexar County—		
S. K. & Co., Barker 1 (WC) sec 58	†	402
Guadalupe County—		
Dees, Broadnax 1 (WC) J. G. King sur	*	2270
Travis County—		
Burns, Lundgren 1 (WC) Henry Martin sur	*	1348
LAREDO DISTRICT		
Duval County—		
Blanchard, Parr 1 (Muralla)	..	4822
Circle, Mew 3 (Fitzsimmons)	300	4255
Cox & Hamon, Hoffman 11 (Hoffman)	77	2905
Magnolia, Weil 43 (Hoffman)	50	2853
Miller, Miller 14 (Longhorna)	350	4935
Sun, Bureggemann (Fitzsimmons)	400	4310
Transwestern, DCRC 27 (297) (SRC)	22	1033
Jim Hogg County—		
Humble, King-Ranch-Colorado 1 (WC) survey No. 36	900	3041
Starr County—		
Aid, Gonzales 1 (WC) sh 6-A porc 71	*	1008
Rowan & Hope, Dallas Bank 1 (Rincon)	*	4506
Sun, Guerra 10-B (Cuevitas)	100	2277
Webb County—		
Humble, Laurel 10 (Killam)	49	2028
Magnolia, Benavides 5 (West Cole)	40	2348
Zapata County—		
Nordan & Morris, Guiterrez 47-A (Escobas)	11	1316

*Failures; †Junked; ¶Million cu. ft. gas.

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After a squeeze job, new perforations were scheduled for the same zone.

A gas well resulted from a completion in A. A. Galler 1, one mile southwest of the East Plymouth field of San Patricio County. It is now shut in with 2000 pounds pressure. Casing had been perforated at 5111-13 feet, a new level for the pool.

Humble Oil & Refining Company further expanded the Vanderbilt-West Ranch area of Jackson County to the north with Vanderbilt-State 1-B, in the south end of Menefee Lake No. 2. This well is just south of the original discovery of the Vanderbilt field and is about ½ mile north of the northernmost producer in the West Ranch area. It cored a sand section with oil showing between 5540-50 feet and was testing at last reports. This field, being developed primarily by Magnolia Petroleum Company and Humble Oil & Refining Company is being rapidly expanded into one of the most prolific producing areas along the South Texas Gulf Coast.

Mountain View is new field in Live Oak County

Beeville. — Mountain View, South Texas' newest field, has been opened in Live Oak County through completion of Sal Vieja Oil Corporation and Western States Gasoline Company's Riser 1 as a small gas producer in the Government Wells sand. The test is located in Section 382, about 15 miles southwest of George West and is on a Shell Oil Company farmout.

The well is now shut in with 750 pounds pressure after casing was perforated in the Government Wells sand at 2477-96 feet. A first test at this level developed both gas and water but the latter was eliminated through a squeeze job. The test had made a small pumping oil well in Hockleyensis sand at 2126-48 feet, but was deepened.

Rincon to get recycling plant and more drilling

Mission.—Rincon district of Starr County, with one condensate well and one oil producer in a 4150-foot basal Frio sand, is to get the drilling of at least 20 wells and the construction of a recycling plant within the immediate future. This became assured following the closing of a development deal by D. D. Davenport, of Mission, with W. R. Davis of Republic National Bank, Dallas. The extent of the deal is not known, some reports being that all of the acreage in the field held by Davenport was sold to Davis in consideration of $250,000 in cash plus a one eighth overriding royalty. The deal was further reported to have required the drilling of at least 10 distillate wells and as many wells to the crude sand, plus the erection of a 60,000,000 cubic foot recycling unit.

It has been known for some time that surveys were made of these properties as a potential recycling prospect. The structure is large, covering possibly 10,00 acres and is held by Transwestern Oil Company, Davenport and others.

Two key wells are being commenced in the Rio Grande Valley district. Sal Vieja Oil Corporation and Pure Oil Company have spudded Gatewood Newberry 2, second well on the large block at the extreme southern portion of Cameron County.

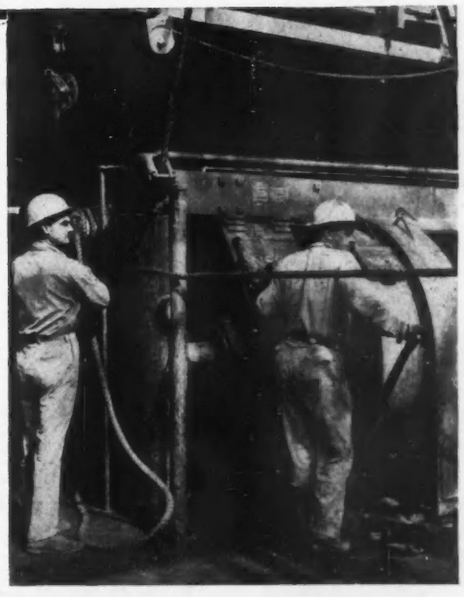
Rowan and Hope have commenced a 5200-foot test several miles northwest of the Sun field of Starr County for Randon Oil Company. The test will be R. E. Margo 1, in Lot 9, subdivision of the Margo lands, Las Comitas Grant. This should carry the well into the Jackson formation, or deeper.

Sun Oil Company was adding another one half mile to the north on the west side of the Sun field, also in Starr County, as it was completing C. V. Lopez 1. The test is in the Southwest corner of Section 237, and is the most northwesterly operation drilled on the structure. On a drill-stem test of sand 4938-54 feet, 400 feet of oil with some mud were recovered along with 5 feet of brackish water in 15 minutes. The pressure mounted to 75 pounds. The hole is bottomed at 4965 feet with casing set on bottom.

Zavala County wildcat plugging back for test

San Antonio.—Although finding the Edwards limestone high, H. F. Wilcox Oil & Gas Company failed to find oil saturation in W. D. Kincaid 1, Zavala County wildcat 3½ miles northeast of Batesville production. It was being plugged back to be completed in a Navarro-Taylor sand at 2093-2125 feet, where a new field is expected to result.

The test, located in the southeast portion of Survey 374½, topped the



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Navarro at 1297 feet, Austin chalk at 2840 feet, Eagleford at 3250 feet, Buda at 3350 feet, Delrio at 3440 feet, Georgetown at 3535 feet; Edwards limestone at 3604 feet, elevation 745 feet, derrick floor. It was near 3750 feet as the week closed, then to be plugged back for the completion attempt.

Since completion of a crevice well to open the Batesville field, an aggressive drilling program has been under way. This is the eighth wildcat for the area.

Colorado field in Jim Hogg gets important extension

Laredo.—Colorado, Jim Hogg County, became Mirando district's newest important oil field through completion of a Cockfield-sand producer to extend production one mile to the north. The area previously had been confined to several hundred acres with all wells being comparatively small producers.

Humble Oil & Refining Company's King Ranch-Colorado 1, Section 42, flowed 435.89 barrels of 42.6-gravity oil per day through 3/8-inch choke with pressures of 225 pounds on tubing and 700 pounds on casing. It had the Cockfield sand at 3032-41 feet.

Second producer in the Muralla field, Duval County, made a large amount of gas and flowed 55 barrels of oil per day through small choke from the 4700-foot Pettus sand. A southeast outpost and second well for the Southland field, Duval County, made a distillate producer from the 5100-foot Pettus pay.

Texas Gulf Coast

Cockburn cores promising sand south of Rosenberg.

Wildcat mile from South Cotton Lake is producer.

Houston. — A promising sand and shale section was cored last week in H. C. Cockburn's Danzig 1, wildcat test located south of Rosenberg, Fort Bend County, but no true sand body has been found along with the several oil shows logged between 5901 and 6025 feet. Late last week the hole was being reamed to bottom at 6220 feet. The well is apparently running higher structurally than other tests drilled in the immediate locality, the Warreni of the Vicksburg having been topped at 5900 feet.

Humble Oil & Refining Company has drilled to 6165 feet in Schwartz 1, Wharton County wildcat test located in the Lane City area, but no shows have been reported. The formation ran largely to shale below 6000 feet.

An extension eastward of the South Cotton Lake field, Chambers County, was recorded last week, with the completion of Salt Dome Oil Corporation's Williams 1, located almost a mile from production. The well was drilled to 6515 feet and initial production was 140 barrels.

Recent completions in the Lovell Lake field, Jefferson County, indicates that the second Frio sand section will be more productive and uniform than the first or upper section. Humble Oil & Refining Company completed 2 producers in there last week, each having been good for better than 150 barrels from around 7800 feet. Shell Oil Company completed Ed Pleasant 2 as a 170-barrel producer at 7800 feet.

Stanolind Oil & Gas Company has completed Wilcox 1, extension test in Turtle Bay field, Chambers County, as a 120-barrel well at 6570 feet. The new producer is a north offset to the discovery well, Lotz 1.

Strake Petroleum Corporation was reported approaching the 6000-foot level in Burford Estate 1, important Colorado County wildcat test in the Columbus area. The formation has been runing to shale with some sand.

The Texas Company made another effort last week to develop commercial production on the Hillje prospect, Wharton County. A squeeze cement job was completed at 5232 feet, and the casing subsequently perforated with 40 shots between 5220 and 5230 feet. The well produced about 25 barrels daily on

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Texas Gulf Coast Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Amelia—		
Stanolind, J. W. Hale 5	280	5375
Anahuac—		
Humble, J. J. Clark 22	600	7080
C. G. Johnson 3-A	545	7077
Barbers Hill—		
Texas Gulf Prod. Co., Kirby B-28.	60	3550
Clear Lake—		
Humble, Hutcheson 5	*	6500
Humble-West C-18	135	5936
Shell, McFadden Trust 6	*	3160
Cotton Lake—		
Salt Dome, Williams 1	140	6505
Dickinson—		
Bennett Oil Corp., Benoist 1	*	....
Esperson—		
General Crude, Fee B-4	350	7624
Fairbanks—		
Amerada-Standard, Oby 10	140	6848
Margay Oil Co., White 3	150	6828
Union Prod. Co., Radley 1	115	7251
Fannett—		
Gulf, Burdages 1	200	7579
Friendswood—		
Humble, West Fee B-34	600	6046
West Fee B-39	*	6565
Hardin—		
Gulf, Tullos 3	350	7633
Humble, Partlow B-6	*	....
Partlow B-7	45	7676
Hastings—		
Stanolind, Curkeet A-33	615	6080
Moore C-18	475	6080
Humble—		
Humble, O'Connor 2	*	4743
League City—		
Phillips, Lobit 5	240	9231
Louise—		
Brazos Young Corp., Mocha 1	150	5152
Lovell Lake—		
Humble, Broussard Trust 6	155	7795
Broussard Trust 8	165	7790
Shell, Ed Pleasant 2	170	7800
Martha—		
Stanolind, Seaberg 1	230	8114
Segno—		
Humble, Kirby BX-13	100	8192
Tomball—		
Humble, Fee-Lamport B-1	400	5567
Turtle Bay—		
Stanolind, Wilcox 1	120	6570
Thompson—		
Humble-Gulf, Davis 13	105	4345
Withers—		
Texas Co., Pierce Estate B-35	¶2	5570

*Failures; †Junked; ¶Million cu. ft. gas.

a production test, but the gas flow was so strong that a commercial flow of oil was not assured at the end of the week. The company stands a chance to complete the well as a producer, however.

In the new Martha field, Liberty County, Stanolind Oil & Gas Company completed Seaberg 2, a direct offset to the discovery well. Depth was 8114 feet and the initial flow 230 barrels through a 5/32-inch choke. Casing pressure was 1860 pounds and tubing pressure 1420 pounds.

In Wharton County, W. Stewart Boyle has drilled to 5750 feet in Britton 1, North Louise area wildcat, and the latter part of the week was shut down in sandy shale while waiting on orders. Another Wharton County test, Humble Oil & Refining Company's Schwartz 1, located in the Lane City district, was drilling in shale at 5700 feet.

Texas Gulf Coast drilling operations were heavier than usual last week, the wide resumption of operations following the 15-day shutdown having been reflected by a sharp increase in the number of completions. Interest in adding new production had been low during the shutdown period. Few outstanding wells were completed last week, but the average yield per well was satisfactory. Of the 33 wells completed, 26 were producers, and total new oil added was 6635 barrels. Seven wells were abandoned.

Railroad right-of-way does not carry mineral rights

United States Circuit Court of Appeals at St. Louis last week held that possession of right-of-way does not necessarily give a railroad the right to exploit underlying wealth, including oil and gas. The decision reversed an order of Federal Judge Moore authorizing Guy A. Thompson, as trustee for the Missouri Pacific Railroad, to drill for oil on sections of right-of-way in Marion County, Illinois.

Thompson, in his petition, declared that operators had sunk wells on property adjacent to the right-of-way and would drain the oil from beneath the rail property unless the railroad drilled wells of its own. The lower court order was appealed by Ohio Oil Company and Magnolia Petroleum Company.

The appeals court, in a decision written by Judge Thomas, maintained the deeds which conveyed the section of right-of-way involved in the action had the "clear intent of conveying to the railroad only a right-of-way easement for its railroad, and not a fee."

Ten Kansas completions initial 10,904 barrels

Wichita.—Ten oil wells were completed in Kansas for a total initial potential of 60,904 barrels daily. One gas well was gauged at 18,000,000 cubic feet daily. Of the 23 completions, 9 were failures, 2 locations were abandoned, and 1 well was completed for salt water disposal purposes. The state reported 22 tests started during the week. Barton and Greenwood counties had 4 each, followed by Rice and Russell with 3 each, Butler, Ellis and Ellsworth, 2 each, and Barber and Jefferson, 1 each.

South Louisiana

Drill-stem test on Henderson prospect promising.

Lafourche Crossing wildcat showing favorably.

Lake Charles.—Interest along the Louisiana Gulf Coast last week was divided between two important wildcat tests promising to open new fields in widely separated areas, and two new locations for testing the Wilcox trend north of the older producing belt.

The Texas Company apparently stands a good chance to obtain commercial production on the Henderson prospect, St. Martin Parish, a drill-stem test of formations below 8500 feet having shown unusual promise. This well, sixth deep test drilled on the prospect, was carried to 9011 feet. After running an electrical log, 7⅝-inch casing was cemented at 8617 feet. Cement was drilled out to 8596 feet and 60 perforations made between 8570 and 8590 feet. The drill-stem test was made with the seat at 8560 feet, using two ¼-inch chokes, open 30 minutes. The well flowed in 17½ minutes with a pressure of 800 pounds and an indicated bottom-hole pressure of 3500 pounds. Nine stands of 37.3-gravity oil were recovered. Screen and liner are being run for production test. The company has persistently tried to develop production on the prospect, the depth of the 6 wells drilled having averaged close to 9000 feet.

Mikton Oil Company is building storage and preparing to make a production test in Martinez 2, wildcat test located near Lafourche Crossing, Lafourche Parish. The well was drilled to 10,515 feet, but the most promising strata were logged a considerable distance above bottom. Cement was drilled out to 10,140 feet, and 24 perforations made between 10,126 and 10,134 feet. On a 24-minute drill-stem test at 10,105 feet, there was a steady flow for 15 minutes with a pressure of 375 pounds. Thirty stands of fresh water were recovered. After a squeeze job on perforations, 49 stands of gas and oil-cut mud were recovered, along with 3 stands of salt water.

Pan American Production Company has made location for Anderson Post Lumber Company No. 1, an important wildcat test in Vernon Parish. Location is 467 feet north and 467 feet east of the northwest quarter of Section 27-2n-11w. The well will test the Wilcox, which should be found around 5000 feet in this area, and drilling will con-

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tinue at least 1500 feet into the formation if necessary.

In Avoyelles Parish, Carter-Rubsamen et al have announced a new wildcat location that will test the Wilcox along the general trend now under consideration between the Texas line and the Mississippi River. Location is 1700 feet south and 480 feet east of the northwest corner of Section 28-3n-5e.

C. B. Bunte has abandoned Hines Timber & Lumber Company 1, Avoyelles Parish wildcat, at 5695 feet. No oil shows were reported. The abandonment followed the failure of 3 other Wilcox trend wells that failed to find production within the past 3 weeks.

In the Delarge field, Terrebonne Parish, Fohs Oil Company has abandoned Buckley-Mahler 1 at 13,258 feet. On a 1-hour drill-stem test the well flowed 36 stands of mud and salt water. This is one of the deepest producing areas in the world.

Continental Oil Company completed 3 wells last week in the Villa Platte field, Evangeline Parish. The 3 new producers were Ludeau-Haas 4, completed as a 146-barrel well at 9044 feet; Oscar Pitre 3, a 225-barrel producer at 9050 feet; and Vidrine-Deville 4, a 500-barrel well at 9095 feet.

South Louisiana Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Bancroft—		
Republic Prod., Lutcher-Moore 10	180	7340
Baton Rouge—		
Wm. Helis et al, D. A. Deplantier D-2	300	6505
Charenton—		
Knisley Oil Co., Hertel 6	*	2782
St. Mary Oil Co., Achel 2	175	1121
Darrow—		
Humble, Community 24	550	4795
Delarge—		
Fohs, Buckley-Mahler 1	*	13,250
Edgerly—		
Emerson Oil Co., Hunter 14	100	3504
Eola—		
J. J. Jones, Baronne 1	*	8715
Golden Meadow—		
Texas Co., Laterre 2	355	10,045
Lafitte—		
Texas Co., Madison Realty B-2	1350	10,081
Little Bayou—		
Canal Oil Co., Bernard 13	440	2791
North Tepetate—		
Atlantic, Klumpp 5	200	9057
Villa Platte—		
Continental, Ludeau-Haas 4	150	9044
Oscar Pitre 3	225	9050
Vidrine-Deville	500	9095
West Gueydan—		
Magnolia, J. B. Ferguson 3	450	7170
Avoyelles Parish—		
C. B. Bunte, Hines Tim. & Lmbr. 1	*	5695

*Failures; †Junked; ¶Million cu. ft. gas.

Arrange more allowable for Lisbon field

Governor Earl K. Long of Louisiana announced last week that he had arranged with three refineries to take approximately 4000 barrels of Lisbon crude and that when the stored oil has been taken under this agreement that the field's allowable will be hiked from 3000 to 6000 barrels daily.

The governor said that Standard Oil Company of Louisiana, Gulf Refining Company and Grogan Oil Company had agreed to take the following amounts daily of Lisbon crude: Standard, 1500 barrels; Gulf, 1500 barrels; and Grogan, 1000 barrels. The latter has been purchasing approximately 2100 barrels daily at Lisbon, practically all the oil run from the field. The governor explained that while the present allowable of the field is 3100 barrels that only about 2100 barrels has been purchased daily and thereby approximately 100,000 barrels has accumulated in storage. This stored oil will be sold first and when this has all been used, the allowable will be increased to approximately 6000 barrels daily.

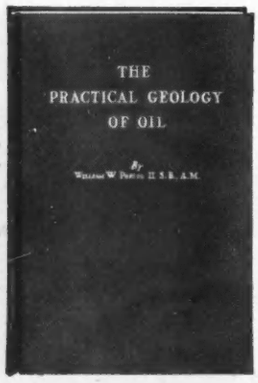
Arkansas proration hearing is changed to Magnolia

The Arkansas Oil and Gas Commission has changed the place of meeting for the hearing called for 10 a. m. September 26 to set allocations for October and November from El Dorado to Magnolia at the same hour and date. The hearing will be held in the Columbia County court house. The change was made at the request of a number of operators. Allowables will be then determined for October and November for the Atlanta, Buckner, Magnolia, Schuler and Village fields. While not in the announcement it is likely that the new Smackover lime oil field at Experiment, Columbia County, will also have an allowable set at that time.

Hearing may consolidate three West Texas fields

The Texas Railroad Commission has scheduled a hearing for September 19, at Austin, to determine whether Wasson, Waples-Platter, and the Bennett field are in fact one field. The fields are located in Gaines and Yoakum counties.

The notice issued indicated that the commission planned to adopt uniform rules for the three fields in the event it is found that they are producing from a common reservoir.



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North Louisiana

Pine Island deep test misses expected sands

Shreveport.—Having missed production in the series of horizons corresponding to the producing zones at Cotton Valley in the lower Marine, Stanolind Oil & Gas Company's Dillon Heirs 131, C SE NE 14-21n-15w, deep test in the shallow Pine Island field, Caddo Parish, cored last week at 7425 feet for the "Sexton sand" of the lower Marine that produces at 9000 feet in the Shongaloo field, Webster Parish. At present depth this operation is 1430 feet below top of the lower Marine at 5995 feet and at Shongaloo the Sexton sand was 1400 feet below top of lower Marine. Therefore, the Pine Island test is at a critical depth.

Longwood Oil & Gas Company's Belcher & Vaughn 1, NEc 28-20n-12w, Bossier Parish wildcat, waited orders last week at 3010 feet after having set 5½-inch casing at 1348 feet and tested dry in the Nacatoch sand.

Arkansas Fuel Oil Company's Louisiana Central Lumber Company 1, C

North Louisiana Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Caddo Parish (Pine Island)—		
Seymour Oil Co., Hughes 1, 15-20n-15w	80	2205

*Failures; †Junked; ¶Million cu. ft. gas.

NW SW 31-12n-3e, Caldwell Parish deep test on a geophysical prospect, drilled at 5658 feet. With elevation of 160 feet it topped Wilcox at 1550 feet after having logged top of Sparta at 566 feet. The upper Wilcox showed no oil. In the same parish, Critchett & Wood's Kyles 1, SW NE 18-11n-3e, drilled below 3702 feet, after topping Wilcox at 1620 feet; elevation is 220 feet.

Lisbon Exploration Company's 8500-foot test at Lisbon, Roberta Vaughn 1, NW NE 36-21n-5w, drilled at 6605 feet; elevation is 362 feet and Travis Peak was logged at 5340 feet. Prairie River Syndicate's Hutchinson 2, SEc Fractional Section 3-15n-12w, drilled at 5120 feet after logging base of massive anhydrite at 4398 feet, 90 feet higher than its previous test 3 miles to the southwest. However, the regional rise is northeast so the difference may not be as far from normal as indicated by the footage difference.

Claude Smith and associates of New Orleans are reassembling a block of wildcat acreage around Section 19-10n-13w, DeSoto Parish, for a 3200-foot test. In LaSalle Parish where Standard Oil Company of Louisiana has had a geophysical unit for some time, O. G. Collins of Shreveport is assembling a block around Section 24-10n-2e. Gulf Refining Company leased 400 acres in Sections 31 and 32-16n-16w, Caddo Parish, from L. Werner Lumber Company. P. N. Stevenson continues to add to his holdings around Section 36-16n-10w, Bienville Parish.

Two outpost operations in two Bienville Parish fields were at the testing stage. One mile northeast of production at Bear Creek, Hunt Oil Company's Southern Advance Company 1, located 300 feet east of C 36-17n-6w, arranged to drill plug in 7-inch casing set at 7313 feet. Total depth is 7957 feet. With elevation of 223 feet this operation topped Pettet lime of basal Glen Rose at 6710 feet but it had no porosity. The test logged the Travis Peak red shale at 7035 feet. Test will be made of a gas-distillate showing around 7200 feet in the Travis Peak.

One mile west of production at Lake Bisteneau but in Bossier Parish, Union Producing Company continued testing after using acid but without show in Lincoln Land Company 1, NE NW SW 17-16n-10w. Total depth is 5667 feet and 5½-inch casing was set at 5250 feet. With elevation of 147 feet it topped Pettet lime (Glen Rose) at 5232 feet and topped the Travis Peak at 5532 feet. In a 10-foot recovery from 5230-50 feet, 5 feet was porous lime but only 15 feet of drilling mud showed in a 9-minute drill-stem test at 5230-50 feet.

Three Arkansas permits

El Dorado, Ark.—Three drilling permits were issued last week by the Arkansas Oil & Gas Commission, as follows:

LaFavette County—East Texas Refining Company and Erwin and Leach, Judy Bell Estate B-1, 330 feet south and 660 feet west NEc SE NW 19-16-23; Nevada County—Benedum & Trees Oil Company, W. R. Mitchell 3, 150 feet south and 330 feet east NWc SW SE 4-14-20; Union County—Joseph E. Moore, Union Sawmill Company 1, 330 feet north and west SEc NE NE 24-17-14.

Arkansas Fields

New gauge on Experiment well makes 26 barrels hour

El Dorado, Ark.—Four new oil wells were completed last week in the Magnolia field, Columbia County, bringing to 62 the number of oil wells producing from the Smackover lime, the only producing horizon in that field.

Two direct and one diagonal offset are in prospect but have not yet had locations made in the new Smackover lime field in Columbia County near Experiment where a fortnight ago, Atlantic Refining Company completed Pinewoods Lumber Company 1, NE NE 16-18-22, at 9002 feet, after perforating casing at 8861-75 feet. Direct offsets are due from Shell Oil Company and Lion Oil Refining Company, while a diagonal offset would be on acreage of Superior Oil Company of California.

On a new gauge last week of the discovery well, it gauged 26 barrels of oil per hour through ¼-inch tubing choke with tubing pressure 1300 pounds and casing, 2425 pounds.

Although the showings were not so good as had been hoped for when formation tester was run, 7-inch casing was set at 5641 feet in Lion Oil Refining Company's Annie 1, C SE NE 29-15-17, Ouachita County, on the west flank of the Smackover field, four miles outside production. Total depth is 5666 feet. With elevation of 168 feet this test topped Smackover lime at 5640 feet; topped Travis Peak at 3145 feet and topped Lower Marine (Cotton Valley) at 4095 feet. A drill-stem test from 5641 to 5654 feet, with three eighths inch choke top and bottom open 15 minutes, only a slight showing of gas developed and no pressure but later tests with the same size chokes showed 80 feet of drilling mud and 20 feet of mud slightly cut with oil. Lion Oil Refining Company continued testing the Graves sand after perforating at 2674-77 feet in Hill 1, SE SE NW 6-18-13, Union County.

Also in Union County, Joe Modisett's Union Sawmill 3, NW NE 13-18-12, a Smackover lime test, drilled at 5695 feet, after topping lower Marine at 3920 feet with oil showings logged in cuttings at 3975-79 feet; 3980-86 feet; 4270-75 feet; and 4930 feet. Northeast of this test Modisett has sold Sinclair Prairie Oil Company a half interest in 430 acres of leases. Skelly Oil Company has acquired two 80-acre tracts in the vicinity and Marine Oil Company took 40 acres in Section 12-18-12.

East of production in the Schuler

Arkansas Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Columbia County (Magnolia)—		
Atlantic, Spain 2, 19-17-19	252	7597
Brown 1 22-17-20	448	7635
Standard, Booth 1, 24-17-20	480	7570
Southwood Oil Co., Walthall 2, 22-17-20	432	7550
Columbia County (Buckner)—		
Standard, Johnson 1, 9-16-22	240	7272
Union County (Schuler)—		
Phillips, Sewell 9, 7-18-17	330	7740

*Failures; †Junked; ¶Million cu. ft. gas.

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field, Union County, Amerada Petroleum Corporation leased 40 acres in Section 6-18-16; 80 acres in Section 7-18-16, and 40 acres in Section 13-18-17. Ohio Oil Company has forfeited leases on approximately 2000 acres it had in township 16, ranges 23 and 24, LaFayette County. In Columbia County, Arkansas Fuel Oil Company leased 40 acres in Section 1-18-23. Barnsdall Oil Company has cured title to approximately 3000 acres of leases in the southern part of township 19 south, range 17 west. These are 10-year leases. Lion Oil Refining Company has also acquired some acreage in this area.

The first test in several weeks in the Village field, Columbia County, was started last week and is drilling below 2290 feet by McAlester Fuel Company in Harris 1, Section 14-17-19.

Mississippi Developments

State's first oil well makes 92 barrels in first 12 hours. Oil tests 32.8 gravity; analysis shows 20 percent gasoline.

Jackson, Miss.—Mississippi's first oil well was completed September 5 when Union Producing Company's G. C. Woodruff 1, located 1320 feet north and 660 feet east SWc 13-10n-3w, Yazoo County, Mississippi, was washed in and in first 12 hours, ending at 6 a.m. September 6, flowed 92 barrels of 32.8-gravity oil through ¼-inch tubing choke with tubing pressure 300 pounds and casing, 240 pounds. Total depth is 4560 feet in Midway (Selma) chalk topped at 4429 feet. With elevation of 175 feet, derrick floor, the test logged top of Wilcox at 1640 feet and top of the Midway black shale at 3602 feet. It was not only Mississippi's first commercial oil well but also the first commercial oil well for the southeastern states.

The well was completed in the presence of a large crowd of oil operators and lease men from all parts of the Mid-Continent area, attracted to the scene after news of the showing of oil in a drill-stem test was disseminated. (The Oil Weekly, September 4, 1939.)

The well is on a geophysical prospect known as the "Tinsley Dome" which was originally mapped by the Mississippi State Geological Survey with F. L. Mellen in charge of the work. It is near the Village of Satartia.

A preliminary analysis of the oil from the Yazoo County well showed the following: naphtha, 10 percent; gasoline, 20 percent; kerosene, 5 percent; asphalt, 17 percent, and gas/oil, 48 percent. Gravity, 32.8.

Some of the favorable points shown in connection with the discovery of oil on the Tinsley Dome are: proximity to river transportation; proximity to railroad facilities; depth not to expensive for extensive exploration in a state where regulatory measures have already been adopted.

Yazoo County embraces an area of 905 square miles and is sharply separable into two physiographic parts, namely, the Yazoo Delta, which includes the northwest two fifths of the county; and the Loess or Bluff Hills, including the southeastern three fifths of the county.

Geologic divisions that appear in outcrops in the county include: the Lisbon and Yegua formations of the Claiborne group; and the Jackson formation of the Eocene; the Vicksburg group of the Oligocene; Pliocene terrace sands and gravels that overlie the Eocene and Oligocene formations and underlie the Loess; the Pleistocene Loess, which occurs on the upland as a blanket that ranges in thickness from 50 to 75 feet in the west to only a few feet in the east; and the alluvial deposits which underlie the Yazoo delta to a depth of 150 feet or more and the thin

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(Left) H. J. DeArman's rig — a *Portable* Model R-876-8A, driven by two Model NKHU 6-cyl. 214 to 226 stripped engine hp. Waukesha-Hesselman Oil Engines — has just completed a 10,720-ft. hole in the Charenton Field, St. Mary Parish, Louisiana.

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Southeastern States Completions

MISSISSIPPI

Company, Well and Location	Init. Prod. Bbls.	Depth
Claiborne County (Wildcat)—		
Claiborne County Dev. Co., Hayden 1, 55-11n-2e	†	3272
Hinds County (Wildcat)—		
G. Jeffreys, Gaddis Farms 1, 26-7n-4w	*	7220
Humphreys County (Wildcat)—		
Union Prod. Co., Box 1, 15-14n-4w	*	5652
Yazoo County (Waldcat-Satartia) —		
Union Prod. Co., Woodruff 1, 13-10n-3w	184	4560

*Failures; †Junked; ‡Million cu. ft. gas.

alluvial deposits that border Black River and some of its larger tributary creeks.

Amerada Petroleum Corporation drilled Campbell 1, NW SW 24-12n-2w, which was abandoned as a dry hole March 23, 1930. The contacts in this hole indicated a major syncline or trough as the Cretaceous was logged at subsea depth of 4731 feet as compared with 2172 feet in a typical well in the Jackson field in townships 5 and 6 north, ranges 1 and 2 east. The theory was then advanced from this hole and from an earlier one drilled in Sharkey County, Mississippi, that logged base of the Midway black shale at subsea depth of 3276 feet where Cretaceous should have been topped but instead picked up igneous material, "that this being the approximate depth that a Chicot County, Arkansas, well encountered igneous and where several igneous plugs have been drilled into, this indicates the main axis of this underground igneous ridge up against which unquestionably are sandy old shore lines that are now proving so prolific in East Texas." It was given as a theory then that "the Tinsley Block is far enough north of this line of igneous plugs and it can, therefore, now be expected that the seismograph work shows that the block (that of Amerada) is on the slope and not on top of this igneous mass or ridge."

A great deal of leasing and royalty trading has occurred in the Yazoo County area. William Tatum for Byrd-Frost, Tyler, Texas, secured 100 acres in Section 7 and 18-10n-2w; Magnolia Petroleum Company, which already had acreage in the vicinity, secured 520 acres in Sections 6, 7- and 17-10n-2w; J. L. Shaw, Ada, Oklahoma, secured 1200 acres in Sections 3, 4, 17, 20, 21 and 18-9n-3w; J. T. Mahan secured 232 acres in Section 6-9n-2w. Others securing various tracts and royalties before completion of the well included: T. H. Robinson, Jr., Paul Chambers, J. A. McDaniels, C. S. Holley, George G. Travis, Lutz Johnson, Howard M. Jones, Eureka Petroleum Company, Ruth Campbell, Ellis Mayfield, C. P. Talbot, G. D. and E. R. Whitaker, M. Carl Jones, K. G. Lynch, E. D. Forehand, and E. Key, Jr.

Triangle Drilling Company spudded a 5000-foot wildcat in Copiah County, south Mississippi, on a 20,000-acre block, this being W. W. Broome 1, SW SE 1-9n-8e.

A great deal of geophysical activity is going on in northwest Alabama. Besides Gulf Oil Corporation's unit working in Marion County, Alabama, and Carter Oil Company's seismograph unit working near the Alabama line in Monroe County, Mississippi, Stanolind Oil & Gas Company has a party of geologists working in and around Jasper County, Alabama. Standard Oil Company of California has a geological party working out of Tuscaloosa and the same company recently moved another into the east part of the Warrior Coal Basin. Both Superior Oil Company and Magnolia Petroleum Company have parties working out of Tuscaloosa. Gulf Refining Company has moved its geophysical party from Horn Island off the coast of Jackson County, Mississippi, to Petit Bois Island off the Alabama coast. In Fayette County, Alabama, J. C. Shepherd, a banker of Berry, Alabama, has acquired over 90,000 acres of leases.

Mountain States Developments

South Dakota test will seek gas supply for Minnesota.

Sundance oil discovered at shallow depth in Wyoming.

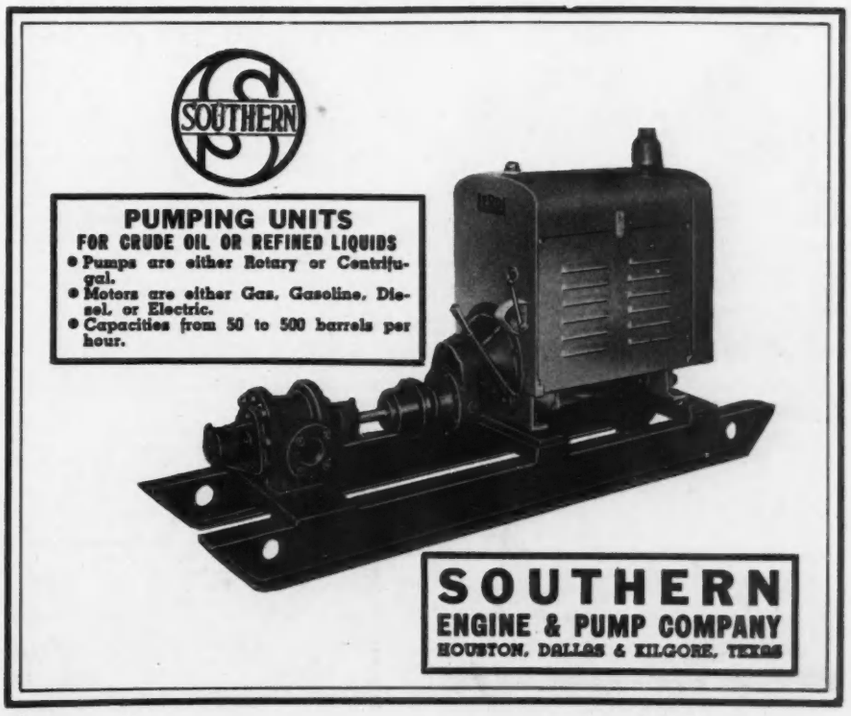
Casper, Wyo. — General Petroleum Corporation was testing production in the Dakota-Lakota sands in its redrilled discovery well on the Cole Creek seismic structure, 14 miles northeast of Casper, Natrona County, central Wyoming. Government 1, NW NW SE 21-35n-77w, swabbed 165 barrels in 8 hours through perforation in the 6⅝-inch liner run to bottom at 8015 feet.

The 6⅝-inch production string was set at 7910 feet on top the Dakota formation. The Dakota series was topped at 7920 feet. Pumping equipment is being rigged and plans are for a 30- to 60-day pumping test. The well completed a year ago for 250 barrels initial from the Lakota at 7974-8013 feet with hole bottomed in the Morrison at 8020 feet. General Petroleum Corporation then moved a mile north on a state section and drilled to 8706 feet where all sands down to and including the Sundance were noncommercial. The Sundance in this well, however, showed good permeability and porosity, and the company decided to drill the discovery to the deeper sand in the anticipation of developing larger production in that horizon higher structurally. The discovery, the present recompleting well, was then drilled to 8511 feet through the Sundance, which carried water. It then was cemented back through the Lakota sand, discovery horizon, and plugged back to the 6⅝-inch casing on top of the Lakota. The 6⅝-inch was perforated in the Dakota at 7912-30 feet and showed for 100 barrels daily. This formation was cemented off and the well plugged back by stages to perforate and test separately up the hole in the Muddy at 7760 feet, and the Mowry at 7600 feet. These formations also showed oil. Tubing was inadvertently cemented in the hole, and after several weeks of fishing, operators set whip stock at 6840 feet and redrilled in new hole to complete in the Dakota and Lakota sands where well is now testing and preparing to rig up pumping equipment.

Nine miles north and a little east of Casper, Continental Oil Company is drilling at 1650 feet in McGrath 1, C NW SW 15-34n-78w, North Geary Dome, Natrona County. This important wildcat is checking some 400 feet higher as it drills in the Steele shale than had been anticipated. Continental Oil Company meanwhile is carrying on an extensive geophysical survey in the general area of Cole Creek-Geary-Midway north of Casper.

South Dakota Test Seeking Gas

State Well Petroleum Company's (formerly reported as State Royalty Petroleum Company) State-1 Unit-3, CSW NE 35-18n-1e, Camp Crook structure, Harding County, South Dakota, is spudding. This well will be watched with keen interest particularly from a gas development angle. The well is taking fuel gas from the Montana Dakota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Utilities Company line from the Baker Glendive field, Montana, to Bismarck, North Dakota, which passes within 1¼ miles of location. The Montana Dakota Utilities Company, subsidiary of Minnesota Northern Power Company, also operates a gas line from Baker-Glendive to Bismarck, North Dakota. Considerable planning has been underway as to the extension of this line to Bismarck into the Minneapolis and St. Paul and into the Mesabi Range iron ore district for a cheap fuel to work the low grade ore. Laying of the line has not been undertaken largely because reserves in eastern Montana are considered inadequate. The Camp Crook structure is a superimposed high on the southeast end of the Baker-Glendive uplift extending through Dawson, Wibaux, and Fallon counties, Montana, into Harding County, North Dakota. Gas for Montana Dakota Utilities Company's franchises is developed in the Baker field, near Baker, Montana, and should the test at Camp Crook develop any sizeable quantities of gas, an extension of the system into Minnesota may be expected. The test is equipped with heavy-duty rotary and contract calls for a 7000-foot plus depth.

Twelve miles west of the LaBarge field, southwestern Wyoming, an important wildcat, suspended for the past several years has resumed drilling. E. T. Williams Oil Company, Casper, has joined Miller Robert Taylor in the completion of State 1, NEc 36-25½-115w, Wyoming Anticline, Lincoln County. The well is cleaning out and testing show of light oil in the Park City formation at 1933 feet. The well was drilled to 1933 feet in 1930 by Mountain Gulf Oil Corporation, which failed to carry to contract depth and the 15,000 acres covering the structure reverted to Taylor. The acreage is unitized and approximately 8000 acres are designated in the unit area. Wyoming anticline has a closure of 1000 feet.

Shallow Strike in Eastern Wyoming

Sundance oil production was discovered this week on the Dewey Dome structure in Weston County, eastern Wyoming, at shallow depth. Bruce C. Teeter's State 1, SW NE 36-42n-61w, bailed at the rate of 10 barrels per day of light oil from 982 feet on a 48-hour test. The sand is lime-cemented and fairly dense and it is believed that an acid wash-over or a small shot would increase production to 25 barrels per day. Teeters is drilling below 1000 feet to deepen the well to its original objective, the Leo sand, expected at around 2250 feet. He is also moving in spudder to drill several wells to develop the shallow Sundance production. The Dewey Dome structure is a local high on a terrace lying between the Black Hills and the Powder River Basin. Midwest Refining Company drilled 3 wells on Dewey Dome to the Dakota sand in 1919 and 1920. Carter Oil Company and others drilled several wells on the Dewey terrace at the same time. Conway Oil Company of Charleston, West Virginia, drilled a well in 1934 on Dewey terrace and completed for 20 barrels daily in the Leo sand. Since then 2 additional wells drilled on the terrace for Leo production have been failures.

Lance Creek Edge Test Starting

In the Lance Creek field, Niobrara County, eastern Wyoming, Continental Oil Company is moving in rotary for Dielman 4-B, SW SW NW 8-35n-65w, which will drill in the southern extension area of the field. On the west side of the field, the company's Otto Rohlff 10, SW SW SE 31-36n-65w, is drilling below 5117 feet and nearing objective, the Leo sands. Argo Oil Corporation this week is digging cellar for Eliott 11-B, NE SE SW 5-35n-65w.

Two near completions at Lance Creek are the Ohio Oil Company's Cash 3 OPC-1, CSW NW SW 4-35n-65w, drilling plug on the 7-inch production casing cemented on top of the Leo sand at 5443 feet. Hole bottoms in saturation at 5439 feet. A. B. Cobb's Novick 4, SE SW 6-35n-65w, on the west side of the field, is swabbing down to complete with the 7-inch production string cemented at 5175 feet and total depth at 5238 feet. C. L. Price this week resumed drilling in Lamb 2, CSE NW NW 7-35n-65w, a southwest Lance Creek well, which had been shut down for the past 3 weeks.

Stanolind Oil & Gas Company is rigging up rotary to drill deeper and recomplete in another Little Buffalo Basin gas field well, Ohio 2, NW NW NE 3-47n-100w, which is drilling deeper from 1344 feet.

Mountain Fuel Supply Company's G. Howard Mosey 1, NW NW NW 18-18n-104w, recent start in the Middle Baxter Basin gas field, Sweetwater County, southwestern Wyoming, is drilling at 2112 feet. Two wells are underway in the LaBarge field, Sublette County, The Texas Company's State 3-E, SW NW 27-27n-113w, is drilling at 811 feet, and Joe Minton's Government 1, SE NE NE 28-27n-113w, is drilling at 758 feet.

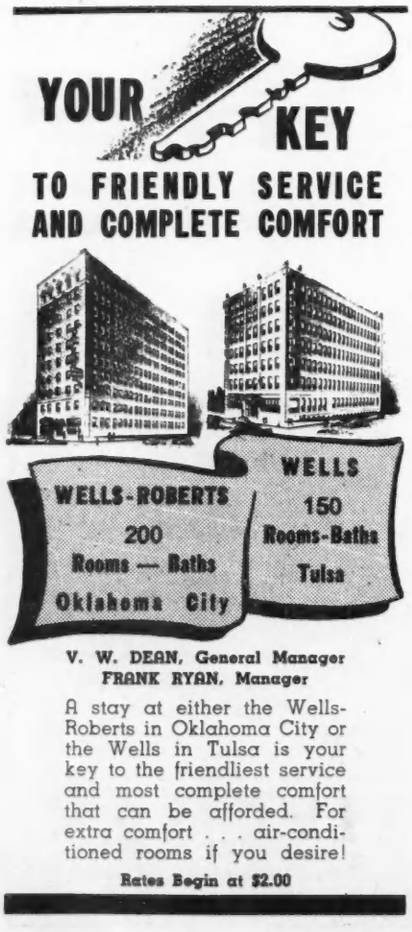
Cut Bank Moving Toward Canada

Northeast extension test to the Cut Bank field, which if commercial will bring Montana's largest field's northern limit within 2 miles of the Canadian border, Italo Petroleum Corporation's Elmer Cornett 1, CSW NW 30-37n-3w, Toole County, is drilling below 1495 feet and is checking more than 100 feet higher than expected. The 10¾-inch casing is set at 523 feet.

Two Cut Bank wells, both in the north area but considerably south of the Italo test, were nearing completion at the close of the week. The Texas Company and A. B. Cobb's Vasbo 1, SW NE SW 27-37n-5w, is testing production at 2655 to 2677 feet in the Sunburst sand, which has recently been proved for oil production in North Cut Bank. The Huber-Montana Company's Hintrager 2, CNW SW 24-37n-5w, is drilling in the Sunburst sand at 2670 feet. The well had a show of gas in the Moulton sand at 2610-2625 feet.

The Texas Company and The California Company's Unit 2, NW SE SW 27-3s-94w, Wilson Creek field, Rio Blanco County, northwestern Colorado, which showed for 45 barrels hourly on drill-stem test in the Morrison formation at 6538 feet, a week ago, is coring below 6700 feet feeling for casing point to set the 7-inch production string through the producing formation and perforate for completion. Drill-stem test was made from 6593 feet. The test may possibly deepen into the Sundance, which more than a year ago showed for large oil yield in the upper section, but ran into water stratum. It is believed with selective completion that the Sundance can be brought into production. The present test is a mile northwest of the discovery which completed in the Morrison formation and is the sole producer in the field.

Continental Oil Company this week spudded its important test near Eldorado, Colorado, Bora 1, SE NE SW 5-1s-69w, on the Eldorado structure, Boulder County. Drilling, which was announced several weeks ago, was held up pending clearing of titles. The company also is deepening Meyer 1, SW 19-8n-68w, an old well in the Fort Collins field, Larimer County, which is being deepened to the Sundance. It is drilling below 4558 feet.



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Mountain States Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
MONTANA		
Glacier County (Cut Bank Field)—		
A. R. Pardue, Triabl-171 3, ne se sw 7-32n-5w	138	2836
Kistner-Watson, Britton 2, sw se se 14-34n-6w	60	2895
A. B. Cobb, Jackson 4, 5-32n-5w	170	2870
Huber-Montana Co., Krueger 1, sw se 11-37n-5w	*	2802
Toole County (Kevin-Sunburst)—		
Pfabe & Engleking, Government 12, cne ne 30-35n-2w	30	1285
G. N. Plotke, Ward 3, w sw sw 28-35n-3w	10	1689
WYOMING		
Big Horn County (Little Buffalo Basin)—		
Stanolind Oil & Gas Co., Government 36, sec se nw 1-47n-100w	¶3½	1551
Niobrara County (Lance Creek)—		
Continental Oil Co., Schuricht 2-B, se sw se 6-35n-65w	2000	5251
Sweetwater County (Lost Soldier)—		
Sinclair-Wyoming Oil Co., Lost Soldier 85-A, se sw ne 16-26n-90w	100	2097

*Failures; †Junked; ¶Million cu. ft. gas.

New Mexico Fields

Monument field is extended a quarter of a mile east

Hobbs, N. M. — Expansion of the Monument field, Lea County, ¼ mile to the east was recorded by Continental Oil Company et al's Britt 8-B-15, near C W½ NW SE 15-20s-37e, with an initial flow of 170 barrels of oil and 481,000 feet of gas through ¾-inch choke after using 2000 gallons of acid. This outpost was drilled to 3882 feet, or 320 feet subsea.

Operations in Lea County have been below normal for some weeks. Four new tests were authorized the past week, including 3 for Continental Oil Company et al. The partnership has derrick up for Lynn 3-A-28, C W½ SE SE 28-23s-36e, an intermediate test for the Lynn and Cooper fields.

In the Mattix field, Continental Oil Company et al's Jack 6-A-20, C SW SE 20-24s-37e, is listed as a late completion, flowing 105 barrels of oil initial through 20/64-inch choke after 75-quart nitro shot at 3542-93 feet. Rig has been moved to drill Jack 7-A-20, C NW NE 20-24s-37e, and derrick is up for the partnership's Jack 5-B-27, C NE SE 27-24s-37e, near the east edge of the field. Anderson-Prichard Oil Corporation's Langlie-Jal 3, SW NW NE 11-25s-37e, is a new operation for the east edge of the Langlie field.

Lovington pool added 2 flowing wells the past week. Skelly Oil Company's State 1-Q, C SE SE 36-16s-36e, tested 11 barrels hourly through 40/64-inch choke after using 2000 gallons of acid at 5075 feet. United Producing Company's Caylor 2, C N½ SE NW 6-17s-37e, southeast outpost, flowed 111 barrels natural through open tubing in 20 hours after drilling to 4945 feet. It is a short distance northwest of Coastal Development Company's Caylor - Phillips 1, which is standing with 800 pounds closed in casing pressure after failing to attain water shutoff in plugging back from 5005 feet to 4785 feet.

The production quota for New Mexico fields dropped to the lowest level attained since June, 1938, when the Oil Conservation Commission reduced the output 11,000 barrels to 100,000 barrels daily for the September 1-16 period. The entire cut was assigned to Lea County areas that are served by 5 trunk lines, while Eddy County and the Maljamar field, Lea County, were raised 863 barrels to 9783 barrels daily on the strength of an increase in nomination by Murchison Pipe Line Company and the entry of McNutt Oil & Refining Company, owner of a refinery near El Paso, with a 500-barrel daily demand.

The allowable of Lea County's wells was cut from 49 barrels to a record low of 42 barrels daily. Eddy County's prorated wells were increased from 63 barrels to 65 barrels daily on the new schedule, but only 80 wells are capable of making the maximum output, and 21 of these are in the comparatively new Loco Hills field.

Eddy County is destined to surpass Lea County in total operations due to the large-scale development in store for the Loco Hills field. Currently the former county has 66 operations as compared to 69 for Lea County. Direct offset requirements are accumulating rapidly in Loco Hills, as the majority of the wells and those pending are on a 10-acre spacing pattern. However, operators are confining their drilling to one well to 40 acres. Market relief will be available late this month through completion of The Texas-New Mexico Pipe Line Company's extension from its Artesia District station. Continental Oil Company and S. P. Yates' Travis 1, SEc 3-18s-29e, pumped 55 barrels of oil and 107 barrels of water in 9 hours after plugging back from 3002 feet to 2670 feet for nitro shot.

New Mexico Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Eddy County—		
Keyes et al, State 3, ne sw ne 9-17s-28e	¶3	1706
Martin et al, Gates 1, se se sw 15-18s-30e	178	3245
Red Lake Oil Co., Reid 1, se sw ne 20-17s-28e	185	1935
Repollo, Parke 6-A, nw sw nw 22-17s-30e	80	3442
Eddy County (Wildcat)—		
Nolen et al, Iles 1, se se se 17-16s-29e	†	1723
Lea County (Langlie)—		
Anderson-Prichard, Wells-Conoco 10, c n½ nw ne 4-25-37	792	3529
Lea County (Mattix)—		
Gulf, Carr 2, c sw nw 10-24s-37e	60	3600
Humble, Williams 5, c nw ne 34-24s-37e	540	3526
Lea County (Vacuum)—		
Drilling & Explo. Co., State-Shell 2-W, nw sw se 26-17-35	1032	4588
Skelly, State 2-P, c e½ ne nw 33-17s-35e	1030	4648

*Failures; †Junked; ¶Million cu. ft. gas.

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California Fields

Wasco and Gatchell fields get production extensions

Los Angeles.—Pacific Western Oil Company's Janssen 1, C 7-27-24, is a completion extending production of the Wasco field a half mile.

Another extension to the Gatchell pool in Fresno County resulted last week when Robert Lytle's No. 7-18F, SWc 18-20-16, was brought in for an initial yield of 2000 barrels of oil per day from 7650 feet. Not far from Lytle's well is E. A. Parkford's No. 45-24C, Section 30-19-15, which has tapped the Kreyenhagen marker around 6500 feet and is below 6900 feet in shale with the expectation of being completed about the middle of September.

The Amerada pool of the East Coalinga Eocene field was strengthened last week when Union Oil Company brought in Cook 86-18, Section 18-19-16, for 500 barrels daily through a restricted choke from 8240 feet. This is the company's first well on the Cook parcel and seven locations are yet to be drilled. The Cook property lies between the Amerada and Bandini leases, both productive.

In the Amerada pool, an extension appears highly probable because of findings in Standard Oil Company's No. 73-19D wildcat, NEc 19-19-16. This project stood cemented over the past week end with 7-inch at 7960 feet and bottom of the hole at 7985 feet in the Gatchell gas zone.

California Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Los Angeles County (Long Beach)—		
Union, Oil Operators 1	248	4532
*** Los Angeles County (West Montebello)—**		
Herley-Kelley Oil, de Staute 1	750	7631
McVicar-Rood Montebello, Beech 1	800	7530
Union, La Merced 33	616	7640
Los Angeles County (Wilmington)—		
Atlantic, Dolley 11	600	5717
Gremac, Gremac 2	700	3800
Royalty Service, Santa Fe B-1	23	5713
Wilton, No. 9	217	5737
Kern County (Buena Vista)—		
Western Gulf, KCL-Panhandle 1	2246	10,175
Fresno County (Coalinga-Northeast area)—		
Union, Cook 86-18	363	8240
Kern Co. (Strand)—		
Tide Water Associated, Strand-KCL-E-24-7	3300	8330
Kern County (Wasco-Semitropic)—		
George F. Getty, Janssen 1	1500	13,131
Fresno County (East Coalinga Eocene Pool)—		
Robert S. Lytle, No. 7-18F	2386	7732
Kern County (Greeley)—		
Standard, KCL 11-19	3560	11,495
Kings County (Kettleman No. Dome)—		
Standard, No. 85-17Q	1840	7545
No. 63-21Q	1235	8190
Kern County (Kern River)—		
W. T. Dick, Dick 2	10	659
Kern County (Mt. Poso)—		
Sunset Oil	60	1580
Kern County (Round Mountain)—		
Vedder Petroleum, Bell 2	225	1850
Kern County (Ten Section)—		
Shell, KCL B-78-20	3300	8215
Santa Barbara County (Santa Maria Valley)—		
F. E. Cole, No. 19	4500	5434
Kern County (Poso Creek)—		
Hall-Baker Explo. Co., de Pauli 1	•	2364
Santa Barbara County (Bicknell Area)—		
Hogan Pet. Co., Zabala 1	•	4155

•Failures; †Junked; ¶Million cu. ft. gas.

Western Gulf Oil Company's KCL-Panhandle 1, Section 3-32-26, has cleaned up from a cut of approximately 12 percent through a 5/8-inch choke and is yielding around 15,000,000 cubic feet of gas and 2200 barrels of 50.6-gravity oil per day from 10,175 feet.

As the well is southeast of Buena Vista Lake, the new area in all probability will be called Panhandle. Much of the acreage is held by larger companies and there is little likelihood of a competitive drilling campaign.

Nine miles south of the Panhandle strike is Shell Oil Company's No. 52-13 wildcat located on a portion of the San Emidio Rancho, Section 13-11-22. It recently bottomed at 10,327 feet in shale and recently cemented 9 5/8-inch casing at 10,297 feet.

North Ward and Sealy get uniform rules

Uniform operating rules for the North Ward and Sealy fields in Ward and Winkler counties were requested by Gulf Oil Corporation at a hearing before the Texas Railroad Commission last week. The principal difference appears to be in the gas-oil ratio allowance, which is 5000/1 in the North Ward field and 3000/1 in the Sealy field. In fixing allowables, the commission uses a factor of .0163734 in the North Ward field and .0714129 in the Sealy field. Each field has 10-acre spacing.

Testimony by the company indicated that pressures, gravities, and other physical conditions in the two fields were approximately the same. There was no objection to the plan.

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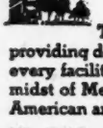

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Michigan Fields

Ottawa County wildcat looms as oil producer

Mt. Pleasant, Mich.—Prospects were considered good this week for another wildcat in Zeeland Township, Ottawa County, to make a commercial well in the shallow Traverse formation. Freeman Oil Company was testing Huyser 1, SW SE SE 5-5n-14w, at 1660 feet after logging a pay at the lime-shale contact which filled open 6-inch hole 500 feet in 18 hours. Operators started to plug the hole back to a 6-inch casing point before making a production test.

Last week Chapman Oil Company completed DeKleine 1, Section 25-5n-14w, 5 miles southeast of the new discovery, for a 20-barrel pumper in Traverse at 1668 feet.

Closely following announcement by the J. V. Wicklund Company that it would deepen State A1, Section 11-18n-1w, Gladwin County, which opened the Buckeye oil field in the 3600-foot Dundee zone in late 1936, deepening operations were announced for another Basin test in a proven Dundee oil field. Carter Lease, Inc., will carry Fee 6, Section 18-13n-1w, Porter Township, Midland County, approximately 900 feet deeper for a test of the Monroe and Sylvania beds. In both projects it will mark the first deep tests for the fields, which were developed only to the Dundee zone.

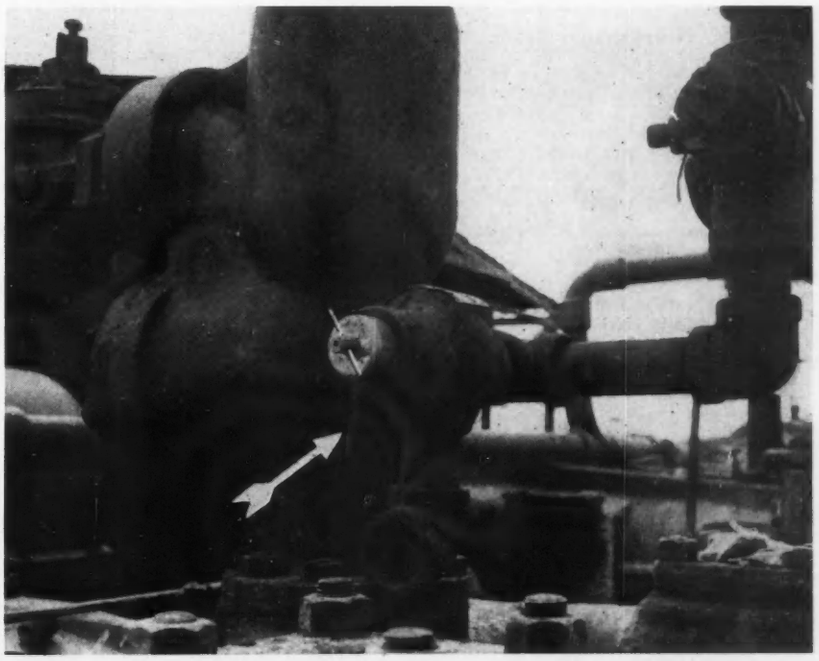
Michigan Completions

Company, Well and Location	Init. Prod. Bbls.	Depth
Allegan County—		
Bell-Marks, Inc., Kidder 2, sw sw nw 23-3n-12w	*	1799
M. S. Porter, Kern 1, se nw se 14-3n-13w	*	1790
Socony Vacuum, Fein 2, nw se nw 2-4n-13w	30	1738
Bridger Basin, Smith 1, ne nw se 15-4n-13w	60	1585
Regal Dutch, Smith 4, se ne nw 22-4n-13w	70	1594
J. V. Wicklund, Smith 4, se se ne 22-4n-13w	50	1586
Salem G&O Co., Smith 3, ne nw nw 23-4n-13w	110	1587
Harry W. Leman, Green 1, sw se se 21-1n-13w	10	1362
Arenac County—		
Don Rayburn, McKay 1, c nw se 10-20n-4e	¶4½	1171
Barry County—		
K. A. Fox, Sharf 1, se se ne 18-4n-9w	*	2295
Freeman Oil Co., Schroeder 1, ne ne ne 5-4n-10w	*	2117
Clare County—		
Taggart, Barlow 14, c e½ 3-18n-6w	¶4	1502
Gratiot County—		
Lang & Lewis, Gee 1, ne nw ne 5-10n-4w	¶1½	987
Isabella County—		
Turner Pet. Corp., Jones 1, nw sw sw 16-16n-3w	20	3709
Kent County—		
Voorhees Dr. Co., Cummings 3 sw sw se 30-7n-12w	1200	1843
Wolverine Nat Gas Corp., Hoey 2, se se sw 30-7n-12w	500	1872
W. H. Thouriby, Denton 1, nw nw ne 31-7n-12w	190	1872
Gordon & Basin Oil, Wildeboer 2, se ne nw 31-7n-12w	250	1889
C. A. Welch, Flivorant 1, nw se se 33-7n-12w	415	1762
Certainteed Product, Fee 1, sw se ne 4-6n-12w	1200	1762
Smith Petroleum Co., Gilbert 7, nw nw ne 4-6n-12w	100	1784
Thomasma 3, ne sw ne 4-6n-12w	60	1785
Wolverine Gas Corp., Thomasma 5, sw ne sw 4-6n-12w	1400	1794
Hogan Bros., Coit 1, ne nw ne 2-6n-12w	*	2265
Welch Oil Co., P. M. R. R. 3, ne se nw 3-6n-12w	800	1784
Pyramid Oil Co., Stiles 2, se ne se 4-6n-12w	350	1761
Lamar Oil Co., Gravel Co. 6, sw ne se 4-6n-12w	1500	1757
Lenawee County—		
Champion Dev. Co., Atherton 1, sw se sw 30-7s-1e	*	1355
Manistee County—		
Maple Grove Oil Co., Niukkaa 1, se nw nw 23-23n-14w	*	2180
Ogemaw County—		
Weber Oil Co., Crawford 8, se se se 28-22n-2e	20	2710
Ottawa County—		
Century Oil Co., Bouwkamp 1, sw sw ne 35-8n-14w	*	1938
Brehm Oil Co., Longnecker 1, se ne se 4-7n-13w	*	1998
Van Buren County—		
Daily Crude Oil Co., Harter 1, se nw nw 32-2s-13w	*	1225
Bert Goen, Harris 2, se se sw 6-1s-14w	*	1235
Mesel & Spelberg, Kahl 2, sw sw se 6-1s-14w	2	1225
L. W. Lawrence, Tennant 1, sw sw ne 6-1s-14w	*	1260
Leman, Tr., Strong 2, sw sw se 2-1s-15w	6	1176
E. R. Jones, Baker 1, se sw se 12-1s-15w	5	1208
J. B. Reed, Cooley 1, se se se 12-1s-15w	5	1203
A. E. Kooparasch, Cooley 3, sw nw se 13-1s-15w	5	1206

*Failures; †Junked; ¶Million cu. ft. gas.

Kiowa lease sale

Anadarko, Okla.—Forty-six tracts of oil and gas leases totaling 6588 acres will be sold by sealed bidding at the Kiowa Indian Agency at 10 o'clock a.m. September 13. Counties represented in this sale are Caddo, Cotton, Grady and Kiowa.



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WILDCAT REPORT
New Starts and Completions

CALIFORNIA

FIRST REPORTS

Los Angeles County—Morton & Elder, Lorenzen 1, dr 5-in hole with portable rig, 1780 ft s, 150 ft w nec 17-4-9, Olive area.

INDIANA

FIRST REPORTS

Gibson County—Paul A. Davis et al's Prudential Life Insurance Co. 1, nw nw nw 36-1n-10w, dk up and pits dug.

Vandenburg County—John L. Drake's K. Keil 1, 200 ft from north line and 300 ft from west line, nw 5-6s-10w, dr below surface pipe.

COMPLETIONS

Gibson County—Longhorn Oil Corp.'s (C. M. Lane's) Dr. McCarty 1, nw se nw 13-2s-11w, top Ste. Genevieve 1987 ft, abnd 2200 ft.

KANSAS

FIRST REPORTS

Greenwood County—Henderson et al's Smith 1-A, nwc se 8-24-11e, lcn. Barker's Gregg 1, sw nw se 35-25-12e, top Oswego 1207 ft, sd 1212 ft.

Jefferson County—Sheedy et al's O'Neill 1, se sw nw 34-8-10e, machine.

Johnson County—Willinbring et al's Ramey 1, nwc sw 17-15-23e, dr.

COMPLETIONS

Comanche County—Kerr-Lynn et al's McMoran 1, c se nw 25-34-16w, 3 mi sw Aetna, top Kansas City 4368 ft, sg 4783-90 ft, top Mississippi 5000 ft, top Viola 5410 ft, top Simpson Dolomite 5590 ft, top Arbuckle 5764 ft, abnd 5808 ft.

Ellsworth County—Murfin's Zajic 1, c sl sw ne 31-16-10w, 2 mi sw Stoltenberg pool, top Topeka 2676 ft, top Lansing 3015 ft, so 3095-3100 ft, top Conglomerate 3325 ft, top Arbuckle 3348 ft, hfw 3372-76 ft, abnd.

Sherman County — Goodland Independent Gas Co.'s Wilcoxson 1, sec nw 27-8-39w, top lime 986 ft, td 1100 ft, completed, 2½ mi e Goodland, 25,000 cubic ft gas.

STATE	WILDCATS STARTED		WILDCAT TESTS COMPLETED							
			Total		Oil		Gas		Dry	
	This Week	This Year	This Week	This Year	This Week	This Year	This Week	This Year	This Week	This Year
Alabama	...	4	...	2	...	...	...	...	...	2
Arkansas	...	26	...	17	...	2	...	...	...	15
California	1	156	...	76	...	20	...	2	...	54
Colorado	...	2	...	1	...	...	...	...	...	1
Florida	...	2	...	1	...	...	...	...	...	1
Georgia	...	3	...	1	...	...	...	...	...	1
Illinois	...	424	...	304	...	21	...	1	...	282
Indiana	2	40	1	25	...	8	...	1	1	16
Kansas	3	181	3	164	...	50	1	6	2	108
Kentucky	7	34	...	19	...	7	...	...	...	12
Louisiana	...	90	...	68	...	11	...	3	...	56
North Louisiana	...	31	...	21	...	3	...	1	...	17
South Louisiana	...	59	...	47	...	8	...	2	...	39
Maryland	1	...	...	...	...	...	...	...	...	...
Michigan	4	184	7	229	...	16	...	...	7	213
Mississippi	1	10	4	9	1	1	...	...	3	8
Missouri	1	41	2	15	...	...	...	...	2	15
Montana	...	2	...	2	...	...	...	...	...	2
Nebraska	...	1	...	1	...	...	...	...	...	1
New Mexico	4	30	...	18	...	1	...	1	...	16
New York	...	...	...	3	...	1	...	1	...	1
Oklahoma	1	127	4	130	...	16	...	6	4	108
Ohio	...	4	1	10	...	1	...	...	1	9
Pennsylvania	...	3	2	5	...	...	...	...	2	5
South Dakota	...	2	...	...	...	...	...	...	...	2
Texas	8	755	16	837	3	78	...	13	13	746
East Texas	1	87	4	80	...	3	...	1	4	76
North Texas	...	96	3	163	1	26	...	1	2	136
Gulf Coast	...	79	...	69	...	5	...	1	...	63
Panhandle	...	7	...	7	...	...	...	...	...	7
South Texas	4	344	6	376	1	29	...	8	5	339
West Texas	3	142	3	142	1	15	...	2	2	125
Utah	...	1	...	...	...	...	...	...	...	...
West Virginia	...	2	...	1	...	...	...	...	...	1
Wyoming	...	5	...	3	...	...	...	...	...	3
Total U. S.	35	2,132	40	1,948	4	233	1	32	35	1,683

KENTUCKY

FIRST REPORTS

Breckenridge County—L. L. Benoist et al's Walter Mooreman 1, 1600 ft from the south line and 1650 ft from east line, section 21-0-36, rig.

Caldwell County—John Wooten et al's Morse 1, 1800 ft from east line and 400 ft from north line, section 12-I-20, rigging up rotary.

Daviess County—A. D. Shaffer et al's S. T. Burns Estate 1, 1700 ft from south line and 400 ft from west line, section 3-N-29, drilling 125 ft. Jack Cox's Dr. Smith 1, 375 ft from south line and 5800 ft from north line, section 4-Q-31, spud.

Hancock County—Garland & Henderson's T. Jackson 1, 500 ft from west line and 3500 ft from south line, section 22-P-33, standing at 40 ft.

Livingston County—J. Harvey Dunn et al's H. L. Dunn 1, 2250 ft from west line and 1400 ft from south line, section 18-H-14, rig.

MICHIGAN

FIRST REPORTS

Allegan County—Spencer Cook's Schruler 1, se ne ne 13-2n-13w, rig. F. Bogart's Kent 1, sw sw sw 2-2n-12w, lcn.

Oceana County — C. W. Teater & W. K. Swan's Skidmore 1, se ne 15-16n-16w, dr.

St. Joe County—Tom McDaniel's Berkey 1, sw sw sw 16-7s-12w, lcn.

COMPLETIONS

Barry County—K. A. Fox's Sharf 1, se se ne 18-4n-9w, Traverse 2243 ft, abnd 2295 ft. Freeman Oil Co.'s Schroeder 1, ne ne ne 5-4n-10w, abnd in Traverse, 2117 ft.

Lenawee County — Champion Dev. Co.'s Atherton 1, sw se sw 30-7s-1e, Sylvania 1265 ft, sg, abnd 1355 ft.

Manistee County—Maple Grove Oil Co.'s Niukkaa 1, se nw nw 23-23n-14w, abnd 2180 ft.

Ottawa County—Century Oil & Gas Co.'s Bouwkamp 1, sw sw ne 35-8n-14w, Traverse 1928 ft, abnd 1938 ft. Brehm Oil Co.'s Longnecker 1, se ne se 4-7n-13w, Traverse 1978 ft, abnd 1998 ft.

Van Buren County—Daily Crude Oil Co.'s Harter 1, se nw nw 32-2s-13w, Traverse 1149 ft, abnd 1225 ft.

MARYLAND

FIRST REPORTS

Garrett County — New Penn Development Company and Wm. E. Snee et al's Humberson (Katherine Shartzer) 1, on Accident dome, elevation 2615 ft, to be carried to Onondaga, expected at 6500 ft, moving in materials.

MISSISSIPPI

FIRST REPORTS

Copiah County—Triangle Drlg. Co., W. W. Broome 1, sw se 1-9n-8e, spudded (5000-ft test on 20,000-ac block).

COMPLETIONS

Claiborne County—Claiborne County Dev. Co., Ruth Hayden 1, s½ se 55-11n-2e, junked 3272 ft.

Hinds County—G. Jeffrey's Gaddis Farms 1, nw se 26-7n-4w, abnd 7220 ft.

Humphreys County—Union Prod. Co., C. B. Box 1, c sw 15-14n-4w, abnd 5652 ft.

Yazoo County—Union Prod. Co., G. C. Woodruff 1, 1320 ft n and 660 ft e swc 13-10n-3w, elev 175 ft, dk floor, top Wilcox 1640 ft, top

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Midway 3567 ft, top Selma chalk 4429 ft, cored 4540-60 ft, 7-in csg cemtd 4538 ft, completed flowing 92 bbls 32.8 gravity oil in first 12 hours, 4560 ft.

MISSOURI

FIRST REPORTS

Adair County — Roger, Morrow et al's Cooley 1, nw se se nw 33-64n-17w, ru machine.

COMPLETIONS

Carroll County—Loomis et al's Henlein 1, c n½ ne sw 31-55n-24w, ssg 247-255 ft, td 255 ft, not enough gas to gauge, being used for domestic use, completed.

Clay County — Pabolo Development Co.'s Morrow 1, 35-52n-32w, otd 500 ft, co 391 ft, 127 ft water in hole, abnd.

NEW MEXICO

FIRST REPORTS

Chaves County—T. S. Stanfield et al's Hal Bogle 1, nw nw ne 27-13s-25e, lcn. Harvey E. Yates et al's Johnson 1, c ne nw 24-15s-28e, lcn.

Eddy County—B. H. Nolen et al's Iles 1-a, 330 ft fr s and 345 ft fr e lines 17-16s-29e, 15 ft w of 1723-foot junked hole, cem 8¼-in cas 291 ft. Stanolind O&G Co.'s J. J. Zorichak 1, c nw sw 7-20s-31e, lcn for 2200-ft test.

OHIO

COMPLETIONS

Lawrence County—National Drilling Co.'s E. C. Culbertson 1, Section 26, Washington tnp, top Clinton 2812 ft, abnd 3170 ft.

OKLAHOMA

FIRST REPORTS

Grant County—Magnolia's Margay-Johnson 1, swc ne 29-25n-8w, lcn.

COMPLETIONS

Alfalfa County—Dye et al's Belter 1, c se 32-28n-10w, 2 mi s Bryon, top Kansas City 4515 ft, top Mississippi 5060 ft, top Woodford 5590 ft, top Simpson 5628 ft, top first Wilcox 5700 ft, top second Wilcox 5745 ft, abnd 5790 ft.

Kiowa County—Lewis et al's Ford 1, nec se 14-7n-19w, 3½ mi n Hobart, top Gabro 1704 ft, abnd 1785 ft.

Pottawatomie County—Yorkan Production Co.'s Hoffman 1, nwc 26-11n-3e, 2 mi nw Shawnee pool, top Woodford 5362 ft, top Hunton 5455 ft, top Sylvan 5490 ft, top Viola 5610 ft, top Dense 5660 ft, top Dolomite 5670 ft, top first Wilcox 5725 ft, top second Wilcox 5803 ft, abnd 5805 ft. Kirk-Green-Way et al's Boland 1, se ne nw 28-11n-3e, 2 mi e Dale, top Woodford 5505 ft, top Hogshooter 5600 ft, no show, top Sylvan 5645 ft, top Viola 5760 ft, top Dense 5778 ft, top Dolomite 5820 ft, top first Wilcox 5853 ft, top second Wilcox 5885 ft, porous dry sand, abnd 5905 ft.

PENNSYLVANIA

COMPLETIONS

Potter County—Updegraph et al's William Hosely 1, Ulysses tnp, top Onondaga 5281 ft, top Oriskany 5306 ft, abnd 5364 ft. P. P. & L. Co.'s E. A. Williams 1, Hector tnp, top Onondaga 5436 ft, abnd 5609 ft.

EAST TEXAS

FIRST REPORTS

Limestone County—J. R. Bunn Drl. Co. & Willis' C. O. Wright 1, 466 ft se of nw lines and 466 ft sw of ne lines of 70-acre tract, M. Clendennen sur, 1 mile se Coolidge, rig.

COMPLETIONS

Houston County—C. C. Dixon et al's Goodman 1, 330 ft out of swc of 90-acre tract, or 2700 ft from w and 2550 ft from s lines of J. J. Thomas sur, ¾-mile e of Lovelady, elev 256 ft, abnd 2850 ft.

Hunt County — K. E. Jennings & R. H. Dooley's V. T. Banks 1, 1400 ft from s and 1770 ft from w lines of 138.84-acre tract & J. W. Haynes sur, 5 mi ne Greenville, elev 573 ft, top Gober chalk 1302 ft, Austin chalk 2070-2107 ft, top Woodbine series 2625 ft, top red beds 2740 ft, top Dexter 2976 ft, top Georgetown lime 3276 ft, abnd 3342 ft.

McLennan County—M. M. Russell et al's J. B. Lindsey 1, 215 varas ne of sw and 110 varas nw of se lines of 168.11-acre tract, G. H. Robertson sur, nw edge Lake Waco, elev 444 ft, abnd 415 ft.

Trinity County—McAlpine Oil Co.'s C. V. Dilley 1, 1200 ft from e and 600 ft from s lines of J. Grissett sur, 7 mi n Trinity, abnd 2386 ft.

NORTH TEXAS

COMPLETIONS

Clay County—Frabor-Hodges Corp.-Sinclair Prairie et al's Kinder 1, 330 ft out of nec lot 11, blk 2, Clark-Plumb sur, top upper Gunsight 1170 ft and lower 1260 ft, top Canyon series 2230 ft, top Caddo 5445 ft, td 5527 ft, pb to 4158 ft, shot 60 qts nitro 4130-52 ft, pumped 107 bbls 38.6° gravity oil and 10 bbls water initial. L. T. Burns et al's E. F. Calloway 1, 1500 ft from s and 330 ft from w lines lot 9, Hopkins C.S.L. sur, A-176, abnd 5353 ft.

Wichita County—Staley Oil Co.'s Mrs. N. E. Banta 1, 2897 ft from s and 330 ft from w line of Thos. Cooke sur, A-34, top Strawn lime 3825 ft, trace oil 3825-29 ft, top Ellenberger 4490 ft, abnd 4586 ft.

WEST TEXAS

FIRST REPORTS

Jones County—Healey-Walters et al's H. H. Warren 1, 330 ft out of nec 128-acre tract, Robt. T. Davidson sur, 5¾ miles sw of Lueders, lcn.

Upton County—N. A. Moore et al's A. L. Mahew-Superior 1, ne ne nw GC&SF sec 2, blk W, mim for 2500-ft test.

Val Verde County—Joiner Oil Corp.'s Sellers 1, 2340 ft from n and 2728 ft from e lines of I&GN sec 59, blk A, 17 mi nw Del Rio, lcn.

COMPLETIONS

Crockett County—J. S. Pittman et al's Corbett-Humble 1, 1320 ft from n and 990 ft from w lines GC&SF sec 15, blk B-2, elev 2540 ft, top anhydrite 790 ft, top salt 860 ft, no water in lime, abnd 2502 ft.

Ector County—J. D. Bodkins et al's H. S. Foster-Humble 1, c se ne T&P sec 12, blk 43, T-3-S, elev 2926 ft, top anhydrite 1690 ft, top Yates 2710 ft, abnd 4600 ft.

Schleicher County—Harold B. Opp et al's J. T. Jackson 1, 1065 ft from n and 2070 ft from e lines T. C. Ry. sec 41, blk LL, elev 2353 ft, Cisco lime 4049-81 ft, used 5300 gals acid, pumped 106 bbls 34° oil initial.

SOUTH TEXAS

FIRST REPORTS

Bexar County — S. K. and C. Production Co.'s Barker 1-A, 150 ft s line, 180 ft w line of 200-ac lse, Jose Maria Becerra survey, sec 58, lcn. Tarver and Akins, Boeck 1, 375 ft s line, 640 ft e line of 73.85-ac lse, Luke Bust sur 37, lcn.

Starr County—Randon Oil Co.'s Margo 1, 800 ft n line, 1320 ft w and e lines of lot 9, subd of Margo lands in Las Comitas gr, Ab-178, moving in.

Williamson County—W. E. Brown's Griffin, scales 3900 ft sw line and 5980 ft nw lines of Harrison Owen sur, spudded.

COMPLETIONS

Bexar County — S. K. and C. Production Co.'s Barker 1, 150 ft s line, 150 ft w line of 200-ac lse, Jose Maria Becerra sur, sec 58, hole caved and well abnd 402 ft.

Guadalupe County—M. H. Dees' Broadnax 1, 900 ft nw line, 1200 ft ne line of 90-ac tr, J. G. King sur, d and abnd in Ed lime, show sulphur water, 2270 ft.

Jim Hogg County—Humble Oil & Refining Co.'s King-Ranch-Colorado 1, 330 ft n, 20 degrees 28 ft e and 330 ft n 69 degrees 32 ft fr nw cor of Hooper and Wade (L. Ramirez) sur No. 36, oil sand, 3032-41 ft, flowed 435.89 barrels per day, 3/8 inch choke, 225 pounds tubing pressure, 700 pounds casing pressure, 3041 ft.

Jim Wells County—William H. Spice, Jr.'s Shallert 1, 4386 ft s line, 1629 ft e line of sh 3-A, Los Presenos de Abajo gr, Ab-171, gas sand 5009-14 ft; gas sand, 5060-67 ft; hard sand distillate odor, 5200-80 ft, abnd 5611 ft.

Starr County—Herbert Aid's Gonzales 1, 250 ft n line and midway between e and w lines of sh 6-A, porc 71, gas sand 683-93 ft, abnd 1008 ft.

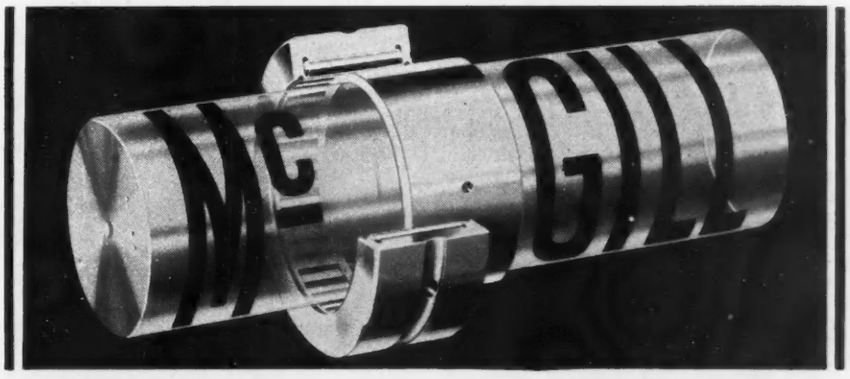
Travis County—Burns Oil Co.'s Lundgren 1, 450 ft ne line, 150 ft nw line 90-ac tr, Henry Martin survey, top Austin chalk 1332 ft.

A Source Book in Geology

"A Source Book in Geology" by Kirtley F. Mather, professor of geology, Harvard University, and Shirley L. Mason, geologist, Stanolind Oil & Gas Company, gives a comprehensive view of the development of geological science during the last four centuries by presenting the significant passages from contributors to that science.

The excerpts, which are portions of the works of 130 noted geologists, are arranged chronologically and cover the development of geology as a science and the molding of geological processes of thought.

Many of the treatises are translations unobtainable elsewhere in this country, many of the others are from publications found in only a few libraries. The book is published by McGraw-Hill Book Company, and can be obtained through the Book Department, Gulf Publishing Company, Box 2811, Houston, Texas. Price is $5.00.



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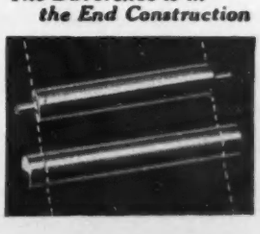

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NOTES FOR THE Equipment Buyer and User

Release Valve

AMERICAN IRON & MACHINE WORKS COMPANY

American Iron & Machine Works Company of Oklahoma City and Houston, announces an improvement in the American Release Valve.

A shock-proof handle is now being installed on the release valve which, it is claimed, makes the operation easy, simple and pleasant for the operator.

The release valve is used on the pump manifold to release pressure on the rotary hose when making connections. It also reduces difficulties usually encountered with stop cocks or release valves used on slush pumps.

Ditcher

CLEVELAND TRENCHER COMPANY

Just announced is Cleveland Model 140, a new ditcher designed expressly for pipe line work by the Cleveland Trencher Company, 20100 St. Clair Avenue, Cleveland, Ohio. This new ditcher will trench anywhere from 18 to 30 inches wide and to 5 feet 4 inches deep.

Mounted on new high crawlers which are 16 inches wide, the machine has a high ground clearance.

The remote-control lever on the main transmission is located directly in front of the operator so that he can quickly and easily shift from one speed to another without taking his eyes from his work in the trench.

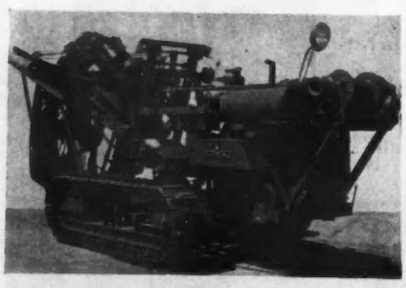
The differential steering which makes the machinery very flexible is controlled by foot pedals which leave the operator's hands free for lever manipulation. A slight pressure on either pedal turns the ditcher in the direction desired. Pressure applied to both pedals simultaneously acts as a positive breaking system.

The "Cleveland 140" is powered with a 6 cylinder gasoline engine as standard equipment, however, Diesels may be obtained if specified.

Working in combination with the main 4-speed transmission, is a net "multi - speed" crawler transmission which is enclosed in a steel housing, entirely anti-friction bearing equipped, and running in a bath of oil.

This new Cleveland ditcher is comparatively light in weight, weighing less than 8 tons. It has a frame in which X-members and trusses of modern alloy steels combine to give maximum strength and utmost rigidity with minimum weight. Boom and frame are of electric welded construction. The boom is over 300 percent stronger than heretofore, being of alloy steel structurals, fabricated in box-sections.

Especially high tractive efficiency is secured by the use of 16-inch crawler-shoes.



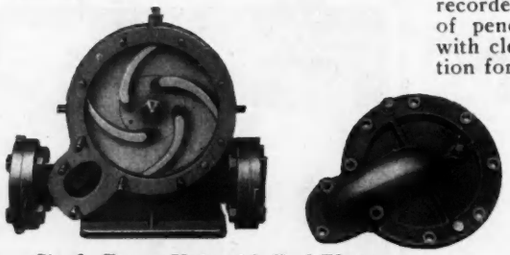
Cleveland Model 1140 Trencher

Centrifugal Pump

THE BOVAIRD SUPPLY COMPANY

A new centrifugal pump for severe oil field service particularly suitable for salt water pumping, drainage or other purposes involving corrosive or sediment carrying waters, and also suitable for clear water service, is being distributed by the Bovaird Supply Company, Tulsa.

The pump has a special open type impeller that is practically self-cleaning, since it is fitted closely to the back plate as well as the outside cover. An outside plate can be removed without breaking pipe-line connections, if it is necessary to clean impeller or repair pump. It is equipped with Timken roller bearings and stainless steel shaft. End plate has "feeler" plug so that impeller may be checked without taking plate off.



Single Pump Unit with End Plate removed

This pump is available in single unit or twin unit mounted on steel skid, V-belt driven with idler. Twin unit is available mounted complete V-belt driven to gas-gasoline engine or electric motor.

Single pump may be direct connected with flexible coupling or V-belt driven to gas-gasoline engine or electric motor.

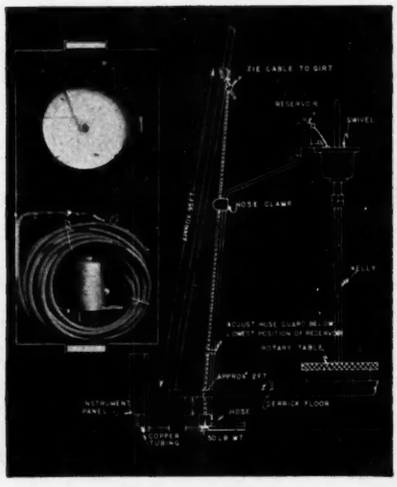
Pumps are available on special order with impeller, outside plate and wearing plate made of cast alloy, bronze or Everdur metal.

Rate-of-Penetration Recorder

MARTIN-DECKER CORPORATION

An Automatic Rate-of-Penetration Recorder for use on drilling wells has been announced by Martin-Decker Corporation, Long Beach, California.

The Rate-of-Penetration Recorder solves the problem of logging formations as they are drilled. It eliminates the inaccuracies of ordinary manual computing methods and provides a simple, positive way to secure time-drilling information automatically and continuously.



Martin-Decker Recorder

Completely automatic in operation, the instrument has only three simple parts—a water reservoir attached to the swivel, a small-diameter rubber hose connecting the reservoir to the recorder, and a special low-range pressure recorder using charts graduated in "feet of penetration." The system is filled with clear water or an anti-freeze solution for cold weather. In operation, the recorder charts the rate of change in hydrostatic pressure from the reservoir as the kelly lowers while drilling. It instantly records formation breaks as they occur and charts a clear, continuous record of bit penetration rate.

The Martin-Decker Rate-of-Penetration Recorder, the makers claim, fills a long-felt need in drilling control technique. For example, the picture it gives of formation changes is invaluable in deciding the coring program. The instrument also indicates porosity of the formations, as well as the formation breaks. This information is a useful supplement to the electrical log, especially in limestone formations. The graph obtained is also valuable as a guide for future production work such as perforating, running tubing, setting packers, etc. When compared to weight, torque, table speed and mud pressure, the instrument gives a clear picture of bit performance in various formations.

Compoundable Welder

HARNISCHFEGER CORPORATION

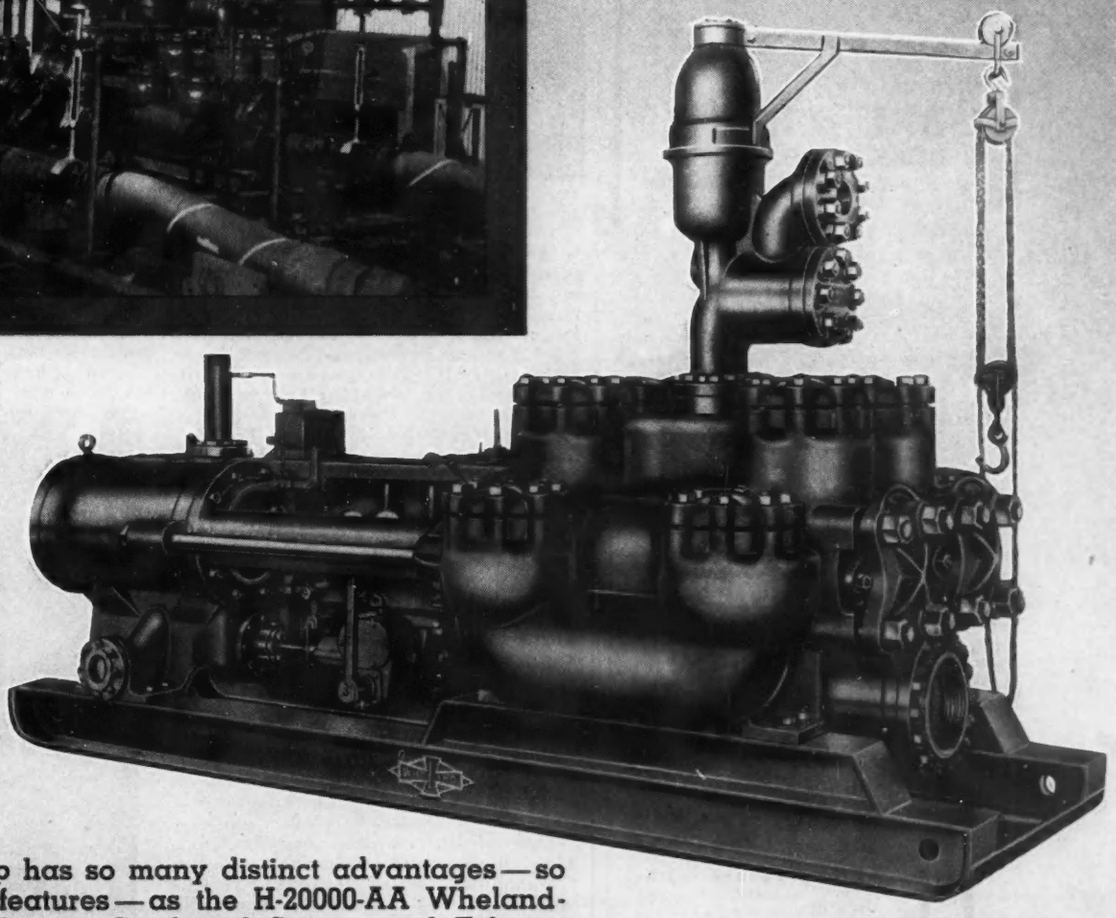
A 200-ampere welder introduced by Harnischfeger Corporation, of Milwaukee, is proving readily adaptable to the needs of welding plants whose average job is one requiring only 200 amperes but where occasional large amperage jobs must be handled.

Designed for easy compounding to handle the larger welding jobs, the new unit provides a simple adaptation to

MORE MUD
SMOOTHER OPERATION
HIGHER PRESSURE
REDUCED STEAM CONSUMPTION

H-20000-AA Wheland - Lucey Steam Slush Pump on Vendome Petroleum Corporation well in Louisiana.

Size: 15½" x 8" x 20"
Maximum Steam Economy.



Rocker Shafts Mounted on Ball Bearings.—Rocker Shafts and Valve Link Fully Inclosed and Operate in oil.—Improved Construction of Fluid Cylinder Head and Liner Retainer.

No steam slush pump has so many distinct advantages—so many revolutionary features—as the H-20000-AA Wheland-Lucey Steam Slush Pump. Combined Steam and Exhaust Valves are located below the Steam Cylinders. The Exhaust Steam must blow out the condensate before leaving the cylinder, resulting in automatic self draining of steam end, improved cushion, improved thermal efficiency, increased mean effective steam pressure, and elimination of broken rings and cylinder heads.

All Liner Adjustment Screws are on the outside of the Cylinder. No screws or threads are in the mud stream. The cylinder is packed by independent gland.

DISTRIBUTORS

Lucey Products Corporation, Tulsa, Okla.

Houston Oil Field Material Co., Inc., Houston, Tex.

Murray-Brooks Hardware Co., Ltd., Lake Charles, Louisiana

Frick-Reid Supply Corporation, Tulsa, Okla.

EXPORT: Lucey Export Corporation, 3505 Woolworth Bldg., New York, N. Y. Broad Street House, London, E. C. 2, England.

THE WHELAND COMPANY

ROTARY DRILLING EQUIPMENT

Chattanooga, Tenn.

BOWEN CO. of TEXAS
Is Another of the Many Oil Tool Manufacturers Depending On

MURRAY RUBBER

The high pressures and extreme abrasive action encountered in oil field service requires the best quality rubber for use as packers in the Bowen Overshot, Spears, Safety Joints, and as line wiping rubbers in the Bowen Line Wiper.

Bowen Overshot and Safety Joint rubbers have been subjected to pressures up to 4500 pounds in actual service, and in the Bowen Line Wiper the rubbers are subjected to a combination of pressure and abrasion that is highly destructive. In all of these products, Murray rubber has given excellent service.

Our modern facilities and strict supervision of all work enables us to give the highest quality and efficient service on mechanical rubber goods and synthetic oil-resisting products.

MURRAY
RUBBER COMPANY
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SURFACE CONTROL

BOTTOM HOLE CHOKING

OTIS REMOVABLE Bottom Hole Regulator is the SAFEST, MOST ECONOMICAL device built for variable control of high pressure withdrawals.

OTIS "Don't Kill Your Well" Call OTIS

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DALLAS, TEXAS

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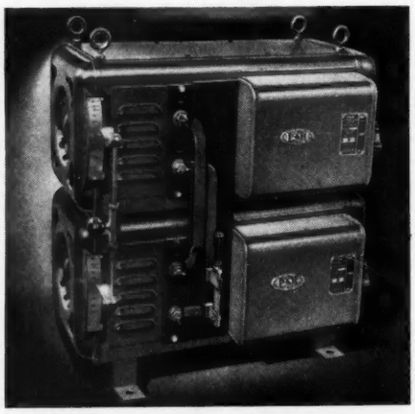
Oklahoma City, Okla.

with OTIS REMOVABLE BOTTOM HOLE REGULATOR

NOTES FOR THE Equipment Buyer and User



Harnischfeger 200-Ampere Compounded Welder

permit hookups in parallel, thus obtaining from two or more of the WA-200 units all of the capacity of an expensive large welder that would seldom be used. The square framed, compact welders occupy only 3½ square feet of floor space and give a welding range from 45 to 200 amperes. Where a wider range is desired two or more of the WA-200 units may be mounted one upon the other and hooked in parallel as illustrated. Thus installed they may be used either singly or in parallel, connected or disconnected at will by means of a switch mounted upon the bottom unit. When used in parallel the multiple units are controlled automatically in one operation by the "multiple shifter," whereby the open circuit and arc voltage are regulated for the proper welding heat.

Mississippi Maps

ZINGERY MAP COMPANY

Zingery Map Company, Houston, has several maps ready on the Mississippi region, where a producing well is indicated for Yazoo County.

One of the maps covers Alabama, Mississippi, eastern Louisiana and the "Panhandle" area of Florida. Drawn to scale of 8 miles to the inch, the map is 6 x 4½ feet in size. It shows townships, ranges, towns and all major geological data. Also included is drilling data that shows location and depth of all dry holes.

Another map, drawn on a scale of 4 inches to the mile, shows the Yazoo City area. It carries land, lease and royalty ownership, expiration dates, etc.

A 21-inch square map of Yazoo shows the area 4 miles in each direction from the discovery well. It does not show expiration data or royalty owners, but all lands and lease owners.

A Yazoo County map divided into the west half and east half shows land owners and lease owners and oil development.

Motor Controls

Cutler - Hammer, Inc., Milwaukee, Wisconsin, has announced a new booklet "Dust the Destroyer" to extol advantages of vertical contacts in starters, overload relays, switches, and allied apparatus.

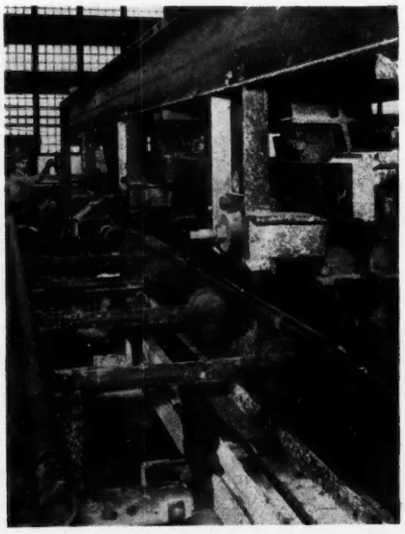
Cement-Lined Pipe

JONES & LAUGHLIN STEEL CORPORATION

An improved process for the manufacture of cement-lined steel pipe for the transmission of highly corrosive fluids has been perfected by the Jones & Laughlin Steel Corporation, Pittsburgh. The product is made on a new high speed mill especially designed for the purpose by the company's engineering department. One of the features of the new plant is a pilot ball mill in which trial batches of the pipe lining mix are ground in order to determine the correct formula for each specific application before production batches are ground in the main ball mill.

Initial shipments of the new J & L pipe have been made to coal mines for sulphur-water disposal systems and to oil fields in Kansas and Oklahoma for salt water disposal lines.

In the J & L process, a special formula, not available on the open market, is used in lining the pipe. A measured quantity of the special mix is placed in the pipe and forced against



J. & L. Machine for Cement-Lining Pipe

Standco
NO-SMOKE
STANDCO BRAKE LINING
for the easiest brake known. It "feeds off" evenly. Standco never scores brake rims. See page 2100 Composite Catalog.
Standco Brake Lining Co.
HOUSTON

NOTES FOR THE Equipment Buyer and User

the walls by a process which, at the same time, extracts a high percentage of the water. This, cement experts agree, is desirable in attaining a lining with the highest physical properties. The process results in extremely even distribution of the mixture. After curing, the pipe is given a final inspection and made ready for shipment.

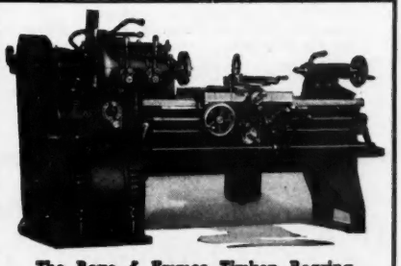
The combination of the special mixture and the process produces an even interior coating so smooth that the lining has a lower friction coefficient than the original pipe, yet is strong enough that no special handling in the field is required to protect the lining, except that the pipe cannot be deformed. The pipe can be shipped, cut to length, and fitted just as unlined pipe—the lining being able to withstand without chipping any blow on the exterior of the pipe which does not actually dent the pipe. This pipe has the same working pressures as regular steel pipe and, while J & L does not manufacture fittings, it is in a position to supply lined fittings for use with this pipe, which is available in sizes of ½ to 12 inches, inclusive, and 14 inches, O.D., in special cases.

R. A. Mackie, Bradford Supply Company Board Head, Dies

Robert A. Mackie, chairman of the board of the Bradford Supply Company, died August 30 at his home in Bradford, Pennsylvania. Mackie, who helped found the company in 1907, and since has been either president or board chairman, had been ill for some time.

G. S. Watson, Jr., Dies From Auto Injuries

George S. Watson, Jr., 28, salesman for McEvoy Company, Houston, died September 4 in a Lubbock, Texas, hospital of injuries incurred in an auto crash. Watson, a University of Texas graduate, was the son of George S. Watson, Sr., vice president and general manager of McEvoy Company.



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MACHINERY CORPORATION

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R. B. Nichols Is New Secretary of Bantam Bearings Corporation

R. B. Nichols has just been elected secretary of Bantam Bearings Corporation, South Bend Indiana, subsidiary of The Torrington Company, Torrington,

R. B. NICHOLS

Connecticut. Nichols has been associated with the bearings business for the past fifteen years, most of this time with Bantam Bearings Corporation.

His wide experience with bearings and bearing problems comes from long contact with actual factory production, having risen from the ranks to the office of superintendent, later being made sales manager. In addition to his new duties, he will continue as sales manager, the position he has held for the past three years.

Wilhoit Representing Otis Pressure Control in Louisiana

L. M. Wilhoit, service engineer for Otis Pressure Control, Inc., Dallas, has been transferred to New Iberia, Louisiana.

Wilhoit is an Oklahoma A. & M. graduate engineer. He joined Otis Pressure Control, Inc., at Oklahoma City and was later transferred to Houston where his position was that of service engineer.

Kinzbach Tool Company Makes Representative Assignments

Kinzbach Tool Company, Houston, Texas, announces new territorial changes in the company's sales and service staff in line with a recent expansion program.

Chas. W. Eichbaum, Jr., who represented Technical Oil Tools, Ltd., for 2½ years and later Hewitt Kuster and Sperry Sun Well Surveying Company

REED'S 'B-R' DRILLING BIT WITH WIRE LINE RETRACTABLE CORE BARREL

HARD FORMATION HEAD (Interchangeable with Soft Formation Head)

REED 'B-R' Drill Collar and 3-Blade Drilling Bit with Core Barrel in position

REED ROLLER BIT CO.

For Shallow Wells

Cup makers since 1912

The World's Standard In Shallow Well Cups

"No Cut Crude" is Nobs Composition's avowed—achieved—objective. Has no equal in shallow well service. Built to our exclusive formula, Nobs are of softer (than Dragon Composition), slightly pliable but tough, wear-resisting materials. "Tailored" by **cup specialists** in our modern plant, under rigid inspection, Nobs Cups are **correct** to last detail for meeting all shallow well conditions . . . If you haven't used Nobs, write for FREE samples . . . also Dragon Composition, for deep wells . . . and Dragon Leather.

THE DRAGON MFG. CO.
Marietta - - - - - Ohio

"On Duty or in Competition . . as Fearless as the Dragon."

Famous MUDS . . . No. 2

MUD PIES

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MUD PROBLEM
No. 2

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CAN I CONTROL
SALT WATER MUD?

Use

HORNKEM
No. 99

PREVENTS MUD
FROM JELLING

HORN
COVERS the OIL INDUSTRY

Manufactured by
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Chemical Division
Established 1897
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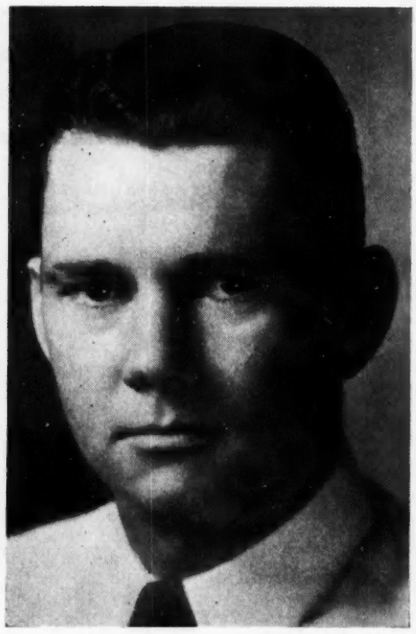
HOUSTON LOS ANGELES

Use HORNKEM
. . . . the Balanced Chemicals
to overcome your mud troubles

C. W. EICHBAUM, JR.



JUDSON McCANN

2½ years, is being transferred by Kinzbach from Houston to the South Texas district. Eichbaum, a graduate mechanical engineer from the University of California, has been working in the oil country since 1927, and joined the Kinzbach sales and service staff early this year.

Judson "Doc" McCann, who joined the organization in August, has been named South Louisiana representative. For the past 6½ years McCann has been with Union Sulphur Company, and previously represented Layne-Louisiana Company. He is a native of Louisiana.

E. M. Smith Becomes Manager Of Globe Oil Tools Company

Announcement has been made that E. M. Smith, founder and former president of Emsco Derrick & Equipment Company, will continue active in the manufacture and distribution of oil well tools in the capacity of general manager of Globe Oil Tools Company, Los Niestos, California.

Smith, or "E. M.," as he is popularly known, began his career as a salesman in the California oil fields in 1907. During the ensuing years he has organized more than a score of companies which have gained world prominence, and he and his associates in these enterprises have contributed substantially to the advancement in design and efficiency of drilling tools. Globe Oil Tools Company is among the companies he was instrumental in organizing. It is a consolidation of three manufacturers of drilling, coring and reaming tools.

Smith for many years has been a world traveler and has visited practically all active fields at one time or another and has a wide acquaintance among oil men. His new duties will require much of his time being spent at headquarters, but he still plans to spend as much time as possible where actual operations are in progress. The company has branches in Houston, Oklahoma City and Casper, and export business is handled through an office at 30 Rockefeller Plaza in New York. Smith stated that the company shortly will launch an aggressive campaign of distribution that will make Globe tools quickly available to the remotest field or well.

National Supply Literature

National Supply Company has released Bulletin No. 249 on the Ideal Hill Hydraulic Weight Indicator, Type H-30, a 300-ton capacity, and Type B, a 200-ton capacity gauge which when mounted between traveling block and rotary hook actuates a direct reading gauge. Also Bulletin No. 251 on unit pumpers for medium heavy duty.

LO-VIS CRYSTALS
CHEMICAL DRILLING MUD THINNER
—ECONOMICAL AND EFFICIENT
—QUICKLY DISSOLVED IN WATER
—READILY ADJUSTS THE VISCOSITY OF DRILLING MUD.
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As envelope suppliers to leading concerns in the Southwest, we solicit your business on the basis of proved dependability, quality workmanship and ability to effect worthwhile economies. May we quote on your next order?
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Squeaks from the Bull Wheel

Best Wishes, Old Man!

"Oh, dear, tomorrow is Tom's birthday and I don't know what to give him. He doesn't smoke, or drink, or play cards, or—"

"That's simple. Give him a hot-water bottle."

Non-cutting

"Sorry to hear your engagement is broken off, old man."

"I'll get over it. But the worst blow was when she returned my ring marked 'Glass—Handle With Care'."

Interior Decorations

Mrs. Brown took her husband to a mannequin parade. An evening gown worn by an extremely pretty model attracted her attention.

"That would look nice at our party next Saturday," she said, hoping her husband would buy it for her.

"Yes," agreed Mr. Brown. "Why not invite her?"

Love Is Blind

"I was a fool when I married you."

"Maybe so, but I was so infatuated at the time I didn't notice it."

Better Off Dead

A wealthy man, intent on matrimony, told his friend one day that he was sixty years old, and he asked his friend, "Would it be better if I told a young lady whom I'd like to marry, that I'm only fifty?"

"I'll be perfectly frank with you," his friend replied. "Your chances would be better if you'd tell her you are seventy-five."

Mechanical

Why did you spell pneumatic "neumatic"?

The "K" on my typewriter isn't working.

Fugutive

"I can not conceive of a meaner, more cowardly act than yours of deserting your wife. Do you realize you are a deserter?"

"If you knowed dat woman like I does you wouldn't call me no deserter. Ah is a refugee—dat's what Ah is."

Learning

What did you think of the sermon on Sunday, Miss Jones?

Very good, sir. We didn't really know what sin was 'til you came here.

Protection

Do you say your prayers at night, little boy?

Yes, sir.

And do you always say them in the morning, too?

No, sir, I ain't scared in the daytime.

Indifferent

"The horn on your car must be broken."

"No, it's just indifferent."

"Indifferent! What do you mean?"

"It just doesn't give a hoot."

Cotton Query

There's a Cabin in the Cotton,
But no Cotton in the Cabin;
Aunt Jemima's gettin' supper
In a dress of acetate.

Uncle Peter, in a polo shirt
And pants of rayon yarn,
Wears a tie of purple silk-spun
While he's milkin' in the barn;

Sara Manth's peelin' 'taters in
Her brand new celanese;
Arabella, in her bemberg
's on the doorstep shellin' peas;

Baby Ned and little Eva,
Crawlin' round the cabin floor,
Have on little lastex rompers
From the 5 and 10-cent store;

Oh, the Cabin's in the Cotton still,
Just like in verse and song.
But with no Cotton in the Cabin, will
It be there very long?

—Charles E. Fenner
in Wall Street Journal

Sunday Morning

"Please give me change for a dime."

"Here you are, sir, I hope you enjoy the sermon."

Shouldn't Sleep

"I never felt so punk in all my life."

"Do any drinking last night?"

"Yes, and when I went to bed I felt fine. But when I woke up I felt terrible. It was the sleep that did it."

Extreme Case

"I've just been reading some statistics here—every time I breathe a man dies."

"Gosh, man! Why don't you read the mouth-wash ads?"

Shopping

"Why, hello! You seem to be busy."

"Yes. I'm trying to get something for my husband."

"Had any offers yet?"

Playing Safe

Did you count with a daisy to see if Jack loves you?

No indeed; it might have turned out wrong. I used a three-leaf clover.

Father Might Act

"If you try to kiss me, I'll call my mother."

"What's the matter with your father?"

"Oh, he isn't as deaf as mother is."

Foolishment

Club member (in the swimming pool): "Stevens, can you float alone?"

Stevens: "Harry, I wish you'd come down to the bank if you want to talk business!"

Must Be Durable

"I want a lipstick."

"What size, please?"

"Two house parties and a dance."

Instinctive Knowledge

"This is a great book on the wonders of nature. To read it makes one realize how lowly and insignificant man is."

"Huh! No woman has to wade through 400 pages to discover that."

ARE YOU Being Robbed of Your Oil?

It's the "G" man for finding oil *(*GOOD for bad producers)*—cleaning out the sand and sediment that holds back YOUR oil.

The MILLER is made in diameters of 2½, 3, 3½, 4, 4¼, 5, 5½, 7 and 9 inches and lengths of 20, 25 and 30 feet. 5/32-inch wall thickness in REGULAR Type. ¼-inch wall tubes HEAVY Type Sand Pumps.

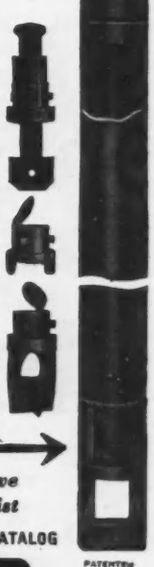
INTERCHANGEABLE BOTTOMS
To Meet Every Condition

● BAILER BOTTOM
With the Bailer Bottom installed the MILLER is quickly changed to a Bailer giving you a combination of either Bailer or a Sand Pump in one tool.

● SAND BOTTOM
Used when tools are run and when well is shot to quickly remove loose material.

● STAR BOTTOM
Used for cutting the sand loose.

● CHISEL BOTTOM
(In Pump)
With this bottom tightly packed sand can be easily broken in small pieces so it can be picked up in the pump.



Write for Descriptive Folder and Price List

See Pages 1564-65 COMPOSITE CATALOG

MILLER Sand Pump Co.

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NO. 1767240
NO. 1952439
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Branches:
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KILGORE, Texas Tel: 545
HOUSTON, Texas Tel: P-2941

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INDEX TO ADVERTISERS

★ Indicates that detailed information on the manufacturer's products or services may be found in the 1939 edition of the Composite Catalog of Oil Field & Pipe Line Equipment.

Page

A

*J. S. Abercrombie Co. —
*Abercrombie Pump Co. 105
Acme Gas Lift Co. —
Air Reduction Sales Co. —
Ajax Iron Works. —
*Allsteel Products Manufacturing Co. —
*Altens Foundry & Machine Works. —
*American Askania Corp. —
American Assn. of Petroleum Geologists. —
*American Cable Division of American Chain & Cable Co. Third Cover
American Cast Iron Pipe Co. —
*American Hammered Piston Ring Division of Koppers Co. 62
*American Iron & Machine Works Co. —
American Manganese Division of The American Brake Shoe & Foundry Co. 48-49
*American Meter Co. —
*American Sand-Banum Co. —
*American Steel & Wire Co. —
Atlas Drop Forge Co. —
*Axelson Manufacturing Co. —

B

*Baash-Ross Tool Co. 59
*Baker Oil Tools, Inc. 3
*Baldwin-Duckworth Division of Chain Belt Co. 57
*Bantam Bearings Corp. —
*Baroid Sales Division —
William M. Barret, Inc. 106
*Bartlett-Hayward Division of Koppers Co. 62
Bellevue-Stratford Hotel 90
Bethlehem-International Supply Co. 37
*Bethlehem Steel Co. 37
*Black, Sivalls & Bryson —
Hotel Blackstone —
*Bradford Motor Works —
*The Brewster Co. —
*The Bridgeport Machine Co. —
*Broderick & Bascom Rope Co. 45
A. M. Byers Co. —
Byron Jackson Co. —

C

Jo H. Cable —
*Cameron Iron Works. 55
*Cardwell Manufacturing Co. 29
Carnegie-Illinois Steel Corp. —
*J. I. Case Co. —
*Caterpillar Tractor Co. —
*Chain Belt Co. —
*Chiksan Oil Tool Co. —
*Clark Bros. Co. —
Clark Machine Co. —
*Climax Molybdenum Co. —
Columbian Steel Tank Co. 35
*Continental Motors Corp. —
Continental Oil Co. —
The Continental Supply Co. 5
Fred E. Cooper Co. —
*The Cooper-Bessemer Corp. —
Core Drilling Co. —
Core Laboratories, Inc. —
*Crane Co. 89
*Crum-Brainard —
*Cummins Engine Co. —
W. H. Curtin Co. —

D

*Darling Valve & Manufacturing Co. 80
Thos. Devlin Manufacturing Co. —
DeWitt Operated Hotels —
*Diamond Chain & Manufacturing Co. —
Dowell Incorporated —
*The Dragon Manufacturing Co. 111
E. I. du Pont de Nemours & Co. —

E

*Eastman Oil Well Survey Co. —
Economy Electric Lantern Co. —
*Elliott Core Drilling Co. —
Elmax Construction Co. 97
Enardo Foundry & Manufacturing Co. —

F

*Geo. E. Failing Supply Co. —
First National Bank & Trust Co. of Tulsa —
*Fluid Packed Pump Company 33
Ford Motor Co. —
The Fort Worth Clearing House Assn. 4
The Fort Worth Laroratories 106
*Foster Cathead Co. —
The Benjamin Franklin Hotel —
*Franks Manufacturing Co. —
Frick-Reid Supply Corp. —
Frost National Bank —

G

*Gardner-Denver Co. —
*The Garlock Packing Co. —
Gas Lift Corp. 94
*Gaso Pump & Burner Manufacturing Co. —
*General Electric Co. —
General Motors Corp. —
Geophysical Service, Inc. —
*Goodyear Tire & Rubber Co. —
*H. P. Gott Manufacturing Co. —
*Grant Oil Tool Co. —
*Gray Tool Co. 67
*Green Head Bit & Supply Co. —
Gulf Publishing Co. 96, 98 and 104
*The Guiberson Corp. —
Gulf Envelope Co. 112

H

*Halliburton Oil Well Cementing Co. —
Hardway & Cathey 106
*Harnischfeger Corp. 103
*Haynes Stellite Co. —
*Hazard Wire Rope Division of American Chain & Cable Co. —
The Hercules Powder Co. —
The Hercules Steel Products Co. —
Hewitt Rubber Corp. —
Hoard Exploration Co. —
*A. C. Horn Co. 112
Houston Laboratories 106
*Houston Oil Field Material Co. 39
*Hughes Tool Co. First Cover
Humble Oil & Refining Co. —
*Hyatt Bearings Division —

I

Independent Exploration Co. —
The Inferno Co. —
*Ingersoll-Rand Co. 68
*International Harvester Co. —
*The International Nickel Co. —
International Petroleum Exposition Second Cover

J

*D. O. James Manufacturing Co. —
*Jarecki Manufacturing Co. —
*Jensen Brothers Manufacturing Co. —
*Johns-Manville —
The Jones Oil Co. —
The S. M. Jones Co. —
*Jones & Laughlin Steel Corp. 87
Jones-Shelburne, Inc. —

K

The Kennedy Valve Manufacturing Co. —
*Keuffel and Esser Co. —
Keystone Driller Co. —
*Kinzbach Tool Co. —
*Koppers Co. 62
Kropp Forge Co. —

L

Landis Machine Co. —
*Lane-Wells Co. —
*Larkin Packer Co. —
*The Layne & Bowler Co. —
Le Roi Co. —
Lee Rubber and Tire Corp. —
Hotel Lenox —
*A. Leschen & Sons Rope Co. —
*The Lincoln Electric Co. —
*Line Scale Co. —
*Link Belt Co. —
Lone Star Cement Corp. —
*Lucey Boiler & Manufacturing Co. —
*The Ludlow Valve Manufacturing Co. —
*Lufkin Foundry & Machine Co. —

M

*MacGlatchie Manufacturing Co. —
MacWhyte Co. —
*D. S. Mair Machinery Corp. 111
*Maloney Tank Manufacturing Co. —
Manhattan Rubber Division —
Mark Twain Hotel —
The Marley Co. —
Marmon-Herrington Co. —
*Martin-Decker Corp. —
Hotel McAlpin —
McCollum Exploration Co. —
*McCullough Tool Co. 75
McEvoy Co. 10
McGill Manufacturing Co. 107
McKissick Products Corp. —
*Merco Centrifugal Co. —
*Merco Nordstrom Valve Co. —
*Metric Metal Works —
*Midco Bailer Co. —
*Miller Sand Pump Co. 113
*Mission Manufacturing Co. Fourth Cover
*Lee C. Moore & Co. —
*Motor Improvements, Inc. —
Mudrite Products Co. 112
Murray Rubber Co. 110
*Muskogee Iron Works —

N

National Bank of Tulsa —
*National Lead Co. —
The National Supply Co. 31
National Tube Co. 42-43
*Novo Engine Co. —

O

*O.C.S. Manufacturing Co. —
*Walter O'Bannon Co. —
*Oil Center Tool Co. —
*Oil City Brass Works —
Oil Well Supply Co. —
*Otis Pressure Control, Inc. 110

P

*The Parkersburg Rig & Reel Co. —
*Patterson Ballagh Corp. 85
*Pelican Well Tool & Supply Co. 99
Petroleum Electric Power Assn. 91
Petroleum Rectifying Co. of California —
Petty Geophysical Engineering Co. —
*Pittsburgh Equitable Meter Co. —
*Pittsburgh Steel Co. —
Hotel Pittsburgher —
Plaza Hotels 4
Plymouth Cordage Co. 95
*Portable Rig Co. —

R

Raybestos-Manhattan —
Reading-Pratt & Cady Division of American Chain & Cable Co. —
*Rector Well Equipment Co. —
*Reda Pump Co. —
*Reed Roller Bit Co. 111
Hotel Reforma 104
*Regan Forge & Engineering Co. 51
*Joseph Reid Gas Engine Co. —
*Republic Steel Corp. 6-7
*The Ridge Tool Co. —
Roper & Todd 106

S

Safety Gas Main Stopper Co. —
Sam Houston Hotel —
Jack A. Schley 106
*Schlumberger Well Surveying Corp. —
The Second National Bank of Houston —
Seismic Exploration Co. —
Seismograph Service Corp. —
Shell Oil Co., Inc. 77
*SKF Industries, Inc. —
A. O. Smith Corp. —
*E. M. Smith Co. 92
*Howard Smith Co. —
*South Chester Tube Co. 93
Southern Engine & Pump Co. 101
Southern Pacific Lines —
Spang Chalfant, Inc. —
*Sperry-Sun Well Surveying Co. —
Standard Supply and Hardware Co. —
*Standco Brake Lining Co. 110
*Star Drilling Machine Co. —
Stevens Hotel —

T

*Templeton, Kenly & Co. —
Texaco Development Corp. —
The Texas Corp. —
Texas Electric Steel Casting Co. 71
Texas Foundries, Inc. —
*Texas Iron Works —
Texas State Hotel 88
Thermoid Rubber Division of Thermoid Company —
Thompson Tool Co. —
*Thornhill-Craver Co. 79
*The Timken Roller Bearing Co. 25
Edgar Tobin Aerial Surveys —
Town House Hotel —
*Tretolite Co. 47

U

*Union Wire Rope Corp. —
Union Carbide & Carbon Corp. —
*Unit Rig & Equipment Co. —
*United States Rubber Co. —
United States Steel Corp. 41 and 42-43
*Universal Atlas Cement Co. 41

W

Warner & Swasey Co. —
The Watson-Stillman Co. —
*Waukesha Motor Co. 100
Webster Engineering Co. —
*Well Machinery & Supply Co. —
Wells-Roberts Hotel 102
*Westinghouse Electric & Manufacturing Co. —
*The Wheland Co. 109
*Wickwire Spencer Steel Co. —
*J. H. Williams & Co. —
*Wilson Manufacturing Co. —
*Wilson Supply Co. —
Witte Engine Works —
*Wood Preserving Corp. 62
*Worthington Pump & Machinery Corp. —
Wyatt Metal & Boiler Works —

Y

Youngstown Sheet & Tube Co. 8

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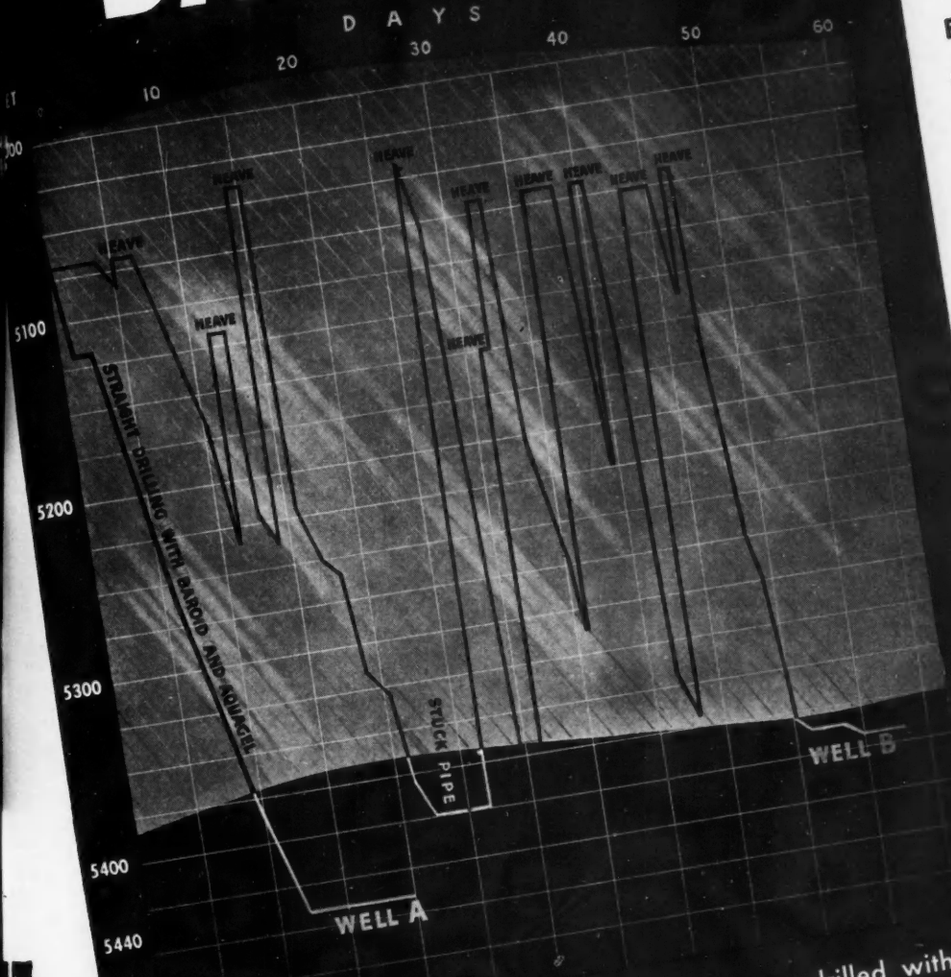

Well "A" used Baroid Products and careful mud control, resulting in drilling through the heaving area in about 20 days.

Well "B" was drilled without regard to mud selection or control. Drilling time through the troublesome area was 57 days.

In wells all over the world, Baroid Products have demonstrated their ability to minimize drilling difficulties and shorten drilling time.

The curve at left was made from the records of two wells drilled in a troublesome area and shows that Well "A" using Baroid Products and control was drilled from the top of the heaving area (about 5040 feet deep), to completion in 37 days less than Well "B" on which other products were used.

This is typical of the results obtained by operators in many fields and proves the advantages of the proper selection and control of drilling mud.

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LOOKING AHEAD

WITH THE EDITOR

When Will Illinois Begin Fading from the Picture?

WITH uncontrolled and rapidly increasing production in Illinois, currently one of the most unfavorable market factors, the industry naturally is wondering when the boom there will reach its apex. It has been considered in some usually well informed circles that the peak of wildcat activity and production in the state would be reached this summer, and that the winter of 1939 would witness a steady and fairly fast decline. But is this true?

The best analytical review and forecast of current and projected exploratory work in Illinois, and its probable outcome, that it has been our pleasure to read is to be published in THE OIL WEEKLY of September 25—next week. Vast authoritative tabulations prepared only with abundant pains-taking effort is the basis for the comments of the author.

Since the situation in Illinois is influencing marketing and producing conditions in all regions east of the Rocky Mountains, you will find this article not only highly interesting but extremely informative.

We have heard in recent months that Illinois wildcatting during 1939 had not brought the results obtained in 1938, but on the contrary more strikes have been recorded in the first 8 months of the year than in all of 1938. True no large fields, like Louden or Centralia-Salem, appear to have been found; but who knows that some of the new fields with only a well or two may not develop growing pains?

If you want to know about the Illinois situation as of today we offer you this forthcoming analysis of wildcat activity in the state.

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